

THE RADIO AMATEURS JOURNAL FOR SPECIALIZED COMMUNICATIONS

# SPEC-COM<sup>TM</sup>

"The Official Publication of the United States ATV Society"

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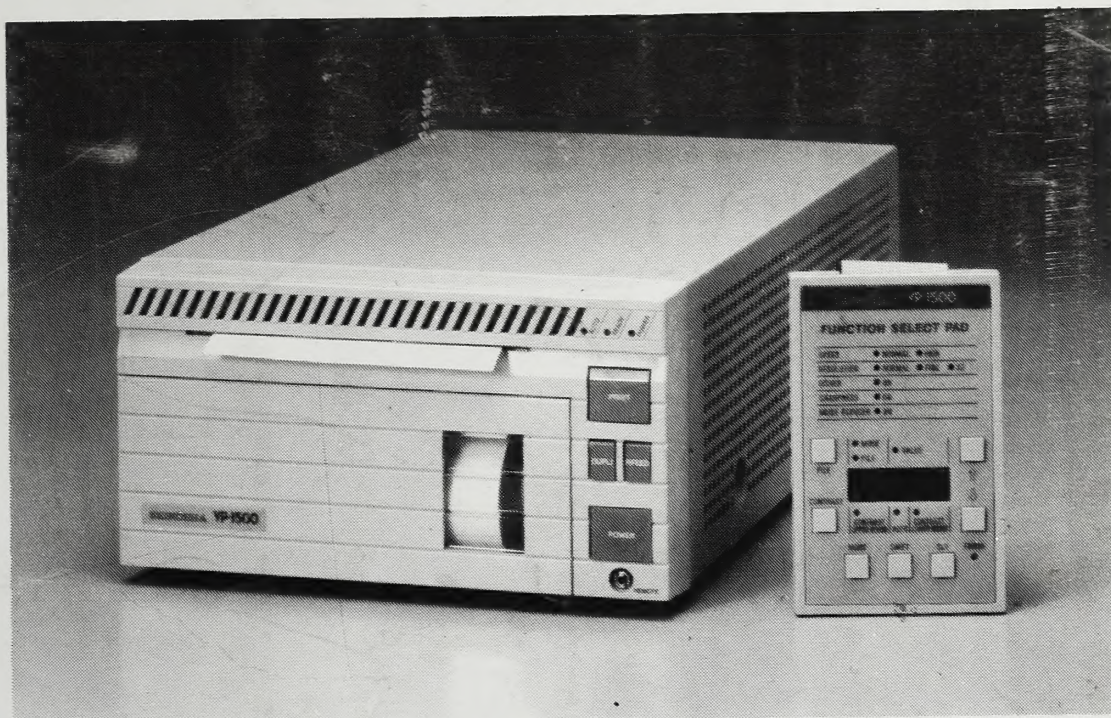
HAM RADIO AMATEUR - FSTV RADIOTELETYPE PACKET OSCAR TVRO  
SHORTWAVE SLOW-SCAN TV MICROWAVE FACSIMILE COMPUTERS

## FCC W.A.R.C. '92 Proposal Threatens Amateur FSTV Mode! Commission Wants to Place L.E.O. Satellites on 420-421 MHz.

Kansas City T-Hunt ATV Helium Balloon Lost!  
Denver, Colorado ATV Balloon Launch Scheduled for November 18th

### North American USATVS FSTV-DX Contest Results!

12-Page "Build Your Own" TV Transmitter Project!  
1990 Year-End Master Article Index  
New "Specialty Modes" Column Writers Onboard!



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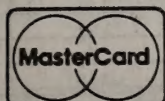
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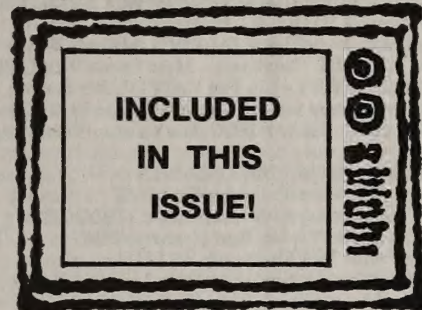
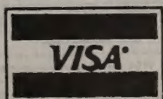
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Another 68 Page Color Issue!

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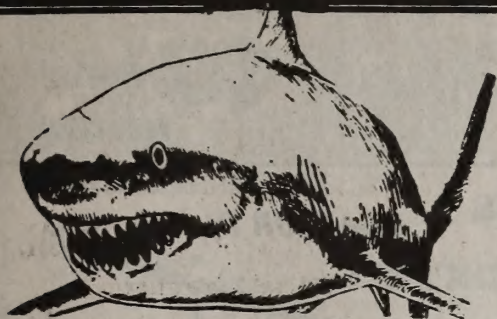
**HIGHLIGHTS!** Uncle Sam in being unkind to 2nd Class Publishers. Price raises are coming to Advertisers. FCC W.A.R.C. Proposal Threatens 421 MHz. We told you about it first! The USATVS is gathering the facts and vows to take legislative action on your behalf. "Welcome" Dale Lam and a NEW Club Column! More helpful answers and Scope tips from Ron Hranac. Best FSTV-DX Contest Event ever! 12-page quality TV Transmitter Project. Give it a try! Cable-TV employs a bunch of Hams. Steve Franklin designs a ZIG-ZAG UHF Omni Antenna for 3-bands. Harry Tootle says "I told you so!" Why not climb aboard? Cartoonist Al starts a new RTTY Column. OSCAR help at last from AMSAT's Joe Holman and finally, Look who published and gave you MORE in '90. What are you waiting for? Turn the page!



[illegible]



## Editorial Comment



### FROM JAW's jaws

by KA0JAW - Mike Donovan

## Publishers slapped with 30% postal increase

Blaming the increased costs of labor and transportation, The U.S. Postal service is hitting all postal classes with a significant rate increase in the first quarter of 1991. Second class postage could go up as much as 40%. Publishers are reviewing alternative methods of distribution and cost cutting programs to soften this serious hit on the bottom line.

To help publishers offset the costs associated with the distribution of magazines and journals, advertisers should expect to see rate increases of 7 to 10 percent. League publications, seriously affected by the increase, will also increase their advertising rates in this range.

The above paragraph headline and short article appeared in a recent ARRL Industry Newsletter. Once again, the U.S. Post Office slaps it to 2nd Class Publishers. This hefty increase in mailing distribution costs has to be passed on one way or the other. Once again, while other magazines subscription charges are raising and/or the amount of readable pages or services dwindle, at this time, we feel our \$20.00 annual rate should NOT be raised upon our loyal readership. As you know, we are under a present campaign to increase the size of the publication - not to give you less. Any business however (especially small ones), must pass on these higher costs to maintain a desired profitable margin percentage just to stay alive. Our incurred costs will be passed on to our commercial advertisers in the form of a slightly higher 10-15% price increase for across the board advertising in all 1991 issues. New rate sheets are being prepared and will be mailed sometime in November. We regret the increase upon our advertisers, but the ARRL headline and article says it all. This makes YOUR BUYING POWER SUPPORT even more important than ever!

We have once again refined the appearance of our publication with COLOR, 68 pages, LASER type setting and, if our printer can obtain for us (paper mill strike in Canada) an improved grade of whiter paper, we shall invest in that upgrade also on a regular basis. We hope you, the valued subscriber/member, enjoy these recent enhancements and that you will tell others about the "new look" of The USATVS Journal so that we may continue to grow with new members to provide you with a superior publication. We believe the changes will help the readability as well as the esthetics.

Beginning with this issue, we are delighted to embody new authors and construction projects, along with our routine stories, news correspondence, product critiques and editorials. As pledged, more than a year ago, we will speak openly and candidly to share our ideology with

each of you - but limit these comments to the editorial fraction of the publication.

An editorial, according to the dictionary, is "an article in a newspaper or magazine published as the expression of an opinion on some issue; of, pertaining to, or written by an editor". We try to share our opinion(s) as editors in each issue with you. We believe editorials raise questions opinions, and they stimulate discussion on topics that we, as specialized communicators, USATVS members, and Spec-Com readers, are often affected by. While the vast preponderance of this publication is "accurate reporting" - we include these thought provoking editorials for the above reason. Remember, however, that they are expressions of an opinion on a topic by the author and not necessarily the opinion of Spec-Com Communications, our Journal nor the USATVS. We are pleased with the response from the readers both pro and con on our editorials. Your input is valued!

Now in our 24th year, we welcome all our new authors to our growing line-up of information on Specialized Communications and we invite all our readers to tender articles, construction undertakings or submit news items for publishing. While HAM-TV continues to be our fundamental focus, we go forward to include "ALL" the specialized modes of communication for your reading. Spec-Com Communications and Publishing Group, LTD. is committed to a road of uninterrupted, continuous improvement and to furnish you with MUCH MORE than any other similar publication for your subscription dollar! We are always exhilarated to hear from you along that road.

I still get a kick out of INTERNATIONAL SHORT-WAVE MONITORING. A few fascinating bits of intelligence from around the world that are of interest to radio enthusiasts include observed frequencies for Radio Free Kuwait's transmissions of 6055, 11990, 17840, and 17890 KHZ from their transitory location in Egypt. This could lead to some entertaining listening! According to a recent report by the Wharton School's Research Update - the Soviet Union's television system is very well-developed although even telephone service is not widespread. Who knows, maybe we will find ATV activity there soon? There is still an abundance of clandestine broadcast pirates operating between 7410 and 7425 KHZ these days. Listen in and let us know what you uncover.

Based on a report, from Bill Kelsey, WA6FVC, who is Chairman of the Southern California Repeater and Remote Base Association (SCRRBA), the 90's will be a decade for the explosion of the AVM service (Automatic Vehicle Monitoring) that utilizes 904 - 914 Mhz. Two companies have been testing this service since November of 1989 and it is now in commercial operation. Southern California has adopted a Band Plan for 33 cm. that represents a 60% reduction in the Amateur 33 cm. spectrum. According to the Band Plan 913.25 Mhz will be used for ATV simplex and repeater input while 917.75 will be used for ATV aural carrier. 927.0 - 927.1, 917.9 - 918.0, and 912.0 - 912.2 will be used for wide band digital and 902.0 - 902.1 for weak signal work. The rest of us need to consider the consequence from this and other services that share the 33 cm. band. Each and every day we are confronted with magnified interference from Military, Medical (ISM), Government, Business, and now Automatic Vehicle Monitoring systems. If we do not address this dilemma we may find a great deal of our frequency spectrum useless. Let's not stick our heads in the sand on this one!

Once again we have mailed hundreds of sample copies to those we reasoned would like the publication. If you received a copy - and are not an official subscriber, we invite you to become a routine "paid" reader of the Journal and a support member of the USATVS. Please take a minute to forward your subscription. We have always accepted Master Card and Visa for your expedience and convenience. For particulars of your subscription see our blurb later in this edition. We also ask that you share this copy with your friends and club members so they too can be part of our mushrooming family.

We have received quite a few early orders for the NEW USATVS "Amateur Television Handbook" that we advertised for in our last issue. The hoped for DEC 1 anticipated SHIP DATE cannot be met. We simply have too much going on to make that quick a deadline. WBOQCD advises me that the issue is about 1/2 pasted up so far. Response from our contributing authors has been great and all want more than first allotted page space limitations. So, we are considering making the book even larger than 96 pages! We will have this book finished and ready for distribution in April at DAYTON. If you sent us your check and want it back, write, give me a call or leave a message. Otherwise - you are on the books to get one of the first copies when they are ready. Thanks.

As we go to press, with the last issue of our expanded Spec-Com Journal for 1990, I want to extend an heartfelt wish to you for a very Merry Christmas and a Happy New Year. I hope 1991 will be a year of peace and tranquility for your family and will render many good band openings. I look forward to serving you through my work with the USATVS and the Journal during the next earth-orbit. On behalf of my family I wish you each a "Extremely Happy Holiday" period! 73's KA0JAW

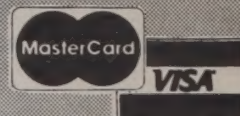




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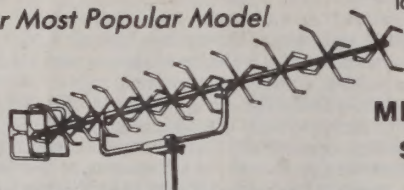
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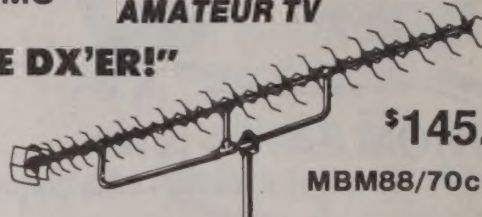
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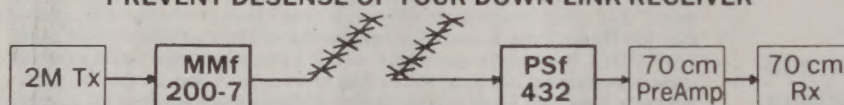
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220 MHz	T/R Switch	85
1690 MHz	Weather sat	250

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6 Meter	10M IF	\$ 75
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220 MHz	10M IF	99
435 MHz	10M IF	114
70cms ATV	TV Ch IF	115
1691 MHz	137.5 IF	250

### TRANSVERTERS

6 Meter	2M IF	\$345
2 Meter	10M IF	315
70 cms	10M IF	ask

### J-BEAM ANTENNAS

137 MHz	2XY-137-C	\$ 90
	5XY-137-C	110
2 Meters	10XY-2M	\$130
	Circ. Pol. Harness	20
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	70-MBM48	99
	70-MBM88	145
90 MHz	DY20-900	\$ 95

### LOOP-YAGIS

23 cms	1268-LY	\$ 70
	1296-LY	70
1690 MHz	1691 LY	75
Extension Kits	1268-LY-XTN	70
	1296-LY-XTN	70
	1691-LY-XTN	75

### BEST HOLIDAY WISHES FROM S.I.!

SPECTRUM INTERNATIONAL, INC. wishes to take this opportunity, during the holiday season, to "thank" all its customers and patrons of 1990 and in years past. Our business, generated by direct advertising via The SPEC-COM Journal, has brought us hundreds of new "friends and acquaintances" that we value very much. Our **FULL LINE** and **SERVICE** to the VHF/UHF and MICROWAVE radio communication hobbyist continues to be available when you need it. Our popular selling **JAYBEAM** line of beam antennas (imported from England) remains our "best seller" for ATV enthusiasts who need WIDEBAND WIDTH radiation AND good forward GAIN performance. Our quality constructed, **INTERDIGITAL BANDPASS FILTERS** assure you the best possible reception or the cleanest transmitted signal possible. We have a number of NEW products coming in 1991 that will certainly be of interest to the VHF/UHF/MICROWAVE communication hobbyist. Watch PAGE 6 in each issue of SPEC-COM for our latest offers. **Best Holiday wishes from S.I.!** -John Beanland G3BVU/W1

### VHF/UHF BANDPASS FILTERS

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PSF 434-5	ATV Channel
PSF 439-5	ATV Channel
PSF 900-3	890-940
PSF 923-5	ATV Channel
PSF 1280-3	1230-1320
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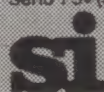
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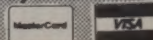


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### FCC PROPOSES LEO OPERATIONS ON AMATEUR 420-421 UHF (ATV) BAND!

The FCC in Washington, on October 1st, 1990, released information about a proposal they will make at the upcoming W.A.R.C. 1992 World Radio Conference scheduled to meet February to March. New LOW-EARTH-ORBITING SATELLITES need operation space on UHF frequencies. The FCC proposes a 900 MHz. band uplink and 400 MHz. downlink for packet type radio signals. To quote the FCC directly; "We believe the existing users in the lower on megahertz of the band can be accommodated within the 421-430 MHz. band." A special USATVS Mode Protection Committee is looking into details of the matter for possible reactive legislative action. More details in WB0QCD's "SYNC-BUZZ" ATV Column this issue... (USATVS)

### REPRESENTATIVE DORNAN LOSES FIRST 220 BATTLE

An attempt to save 220-222 MHz. by Congressman Representative Robert K. Dornan (R-CA) has failed. Congressman Dornan is trying to help the Amateur Radio community by adding an amendment to the 1991 Defense Authorization bill to which Rep. Dornan wanted a 216-225 MHz. restoration rider. Arguments now head for the Washington, DC appeals court which is set to hear oral arguments on the issue in a few weeks. (WESTLINK)

### KANSAS CITY 2 METER TRANSMIT HUNT BALLOON 'LOST'!

An October 20th launch of a small helium filled weather balloon (KD0FW) by the Kansas City ATV Club, carrying onboard Amateur Radio VHF radio and ID gear, has been declared LOST somewhere NE of the launch area. In a telephone interview with Dale Lam WA0NKE - Lam commented great disappointment by the group in the loss of the equipment. The launch was part of an all-day "get-together" by club members in which a planned one-hour transmitter hunt (the balloon) would be conducted followed by a cookout-picnic dubbed "HAMFEAST". One good note however, the balloon's 2 Meter audio on 144.340 MHz. was heard several hundred miles away Saturday morning in Iowa. Maybe someone will eventually find it and call the package number. Let's hope so!

### NEW EC BBS ATTRACTS MANY 'HAM' COMPUTER USERS!

The new ELECTRONIC COTTAGE telephone landline BBS system in Dubuque, Iowa is attracting quite a bit of attention! Systems Operator (SYSOP) Bill Fay KA0FDI informs us that he has seen a significant activity increase factor of outside Iowa calls into the board by Amateurs. Pat Powers has been assisting Mike Stone WB0QCD for the running of the special HAM RADIO side of the MENUS. The board is loaded with all kinds of goods and services and text articles relating to specialized modes. Many USATVS Staff Members are regularly communicating through this network. To contact the EC BBS, set your Telephone Modem software to 300 to 2400 baud at 8-N-1 and call (319) 582-3235.

### HUNDREDS OF 'FREE SAMPLE' ISSUES MAILED

Once again, hundreds of FREE SAMPLE issues of The SPEC-COM Journal have been mailed (under correct complimentary issue 3541 categories) to potential interested specialized communicators from dozens of mailed in CLUB LISTS in response to an AEA FSTV-430a RIG "giveaway". IF YOU RECEIVED A COPY OF SPEC-COM AND YOU DO NOT NOW SUBSCRIBE, this is a complimentary "gift" issue. The publishers hope you like what you see and will respond by sending in a regular subscription.

### DX'ERS GETTING ANGRY AT SAREX

"Their area?"

145.95 will be a "hot" Packet operating frequency if STS-35 ever gets off the ground. That is where SAREX Packet operations are planned. This could very well be at the same time as the CQ WORLDWIDE SSB Contest is on which is sure to disrupt many DX "hot tips" on AX.25. DX Packetcluster operators are quite concerned that "their" area is being invaded by the ARRL & AMSAT.



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The USATVS Journal

**NEWS BULLETIN**



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Who says I don't smile?"

### FCC PROPOSES LEO SATELLITES ON 420-421 MHZ. TO W.A.R.C.!

Just as we go to press, in yet another **SERIOUS THREAT** against ATVers, the FCC in Washington, on October 1st, released its first thinking on positions felt that it should take up at WARC-92 scheduled to be held between February 3rd and March 5th in 1992. One particular discussion that might be a direct threat to the existence of 70 CM. Fast Scan TV operations for Repeaters - was in the area of frequency allocations for LEO satellites (LOW-EARTH ORBITING SATELLITES). The FCC intends to push for a proposal of using 930-931 MHz. as the LEO UPLINK and 420-421 MHz. as the LEO DOWNLINK. The LEO concept, was pioneered in the amateur satellite service by AMSAT. Two commercial firms (ORBCOMM and Starsys, Inc.) have already petitioned the FCC to establish this kind of service for packet type (NOT TV) store and forward communications. Amateur Radio operates on a secondary basis in that area - mostly as ATV Repeater output functions. To quote a direct comment from the FCC regarding this dangerous situation; "We believe the existing users in the lower one megahertz of the band can be accommodated within the 421-430 MHz. band." It looks certain that the FCC has already made up its mind to take away the bottom part of an already crowded 70 CM. user-mode band. Nearly 100 ATV Repeater systems may have to re-crystal up if Ham video signals were to interfere (or be intertered with) with Earth Dish send/receive stations into a higher area - if this is proposed and adopted at WARC-92. Shifting to a higher frequency for a wideband TV signal causes all kinds of dense and other mode/packet and link interference problems. All VSB bandpass filters would have to sent back in for realignment or possible change. **WE HAVE TIME TO VOICE OUR OPINIONS ON THIS MATTER** both to the FCC and the ARRL. The USATVS "Frequency and Mode Protection Committee" will be looking into this for legislative action. Thank God "someone" had the forethought to DATABASE all known existing FSTV Repeaters into one impressive long list with names and addresses of SYSOPS and SPONSORING groups to battle this with some intelligent reasoning. OK, you're welcome.

### MOST EVER IN N.A. FSTV DX CONTEST!

We had the most entries ever this year in our 9th Annual North American FSTV DX Contest! There were several reported BAND OPENINGS in late August which helped to make some pretty high scores. KF0FQ - down in Climax Springs, MO. worked a number of Arkansas, Missouri, Kansas and Iowa stations at 100 and 300 mile ranges (X13 DX Multiplier!) to take "FIRST PLACE" honors. Congratulations Buddy! The Kansas City ATV Group and The Western Vision ATV Network (Colorado) really went all out with some unusual mobile and FM operating methods (see comments about the contest inside this issue). Here in Iowa, I heard only one station contest DX'ing all week. It was quite interesting however, as the band was open towards the end of the week and many Ohio, Indiana and Illinois FSTV stations did indeed work into Iowa to get some points for themselves anyway. A few local area ATVers finally learned what the secondary 147.450 MHz. frequency was all about (alas, one of my DX secrets is out). A number of contest participants sent us comments and ideas about possible changes to make the event operate better and more fair.

## "SYNC-BUZZ" ATV COLUMN"

Mike Stone WB0QCD

R2 Box 86.

Clarence, Iowa 52216

### KANSAS CITY TRANSMITTER HUNT BALLOON LOST!

Big disappointment down in the Kansas City area. An October 20th, 9:15 am. launch of a (smaller) 3 foot helium filled weather balloon with onboard 2 meter transmitting gear and a voice identifier (valued about \$200) has been LOST. The flight was expected to be only about an hour but it lasted far longer than figured computer calculations. Direction of flight was NE of the KC area. Hopefully, someone will find it and call.

### NEW N.T.S.C. MEANING FOR SOME

A NEW group of Fast Scanners has popped up down in the DALLAS/FT. WORTH, Texas area (J.R. Country)! The group is called: N.T.S.C. (I love it). W5YV heads the group and with the help of others, they have, an "on-the-air" (USATVS registered) brand new ATV Repeater system housed and located at the 1,275 foot level on a commercial broadcast TV tower! "We corrected a mistake made by an ATV Group that proceeded us here in the Dallas area" stated W5YV in a late August telephone interview, "in that we elected to go completely HORIZONTAL both on our crossband INPUT and OUTPUT (1277 IN/421.25 OUT)". The group had some real problems for awhile that halted their progress, when a homebrew interdigital 7-pole bandpass filter was built (based on an construction article)

in which the performance of the filter (once swept by K7IMS with proper equipment) would not even roll-off on the lower segments of the 430 MHz. band. Some serious untested design errors exist for those who build this filter and want to use it for 421.250 MHz. outputs (it works fine from 427-439 MHz.). The Group was quite disappointed after wasting a lot of time, expense and effort and elected to purchase a model from SPECTRUM INTERNATIONAL. The model from S.I. had a bit more insertion loss than desired, but did the trick keeping out tons of commercial Radio and TV signals from entering their Amateur TV system. W5YV promises an "updated" article about this and their new system to The USATVS in a future issue.

### DALE LAM WA0NKE NEW "CONTEST & AWARDS" MANAGER!

Dale Lam WA0NKE of the Kansas City ATV Club has been announced as the new USATVS/SPEC-COM "Contest & Awards" Manager. He also begins a new CLUB, CONTESTS and SPECIAL EVENTS regular column beginning with this issue. Congratulations and Welcome aboard Dale! PLEASE SEND ALL YOUR CLUB AND AREA FSTV ACTIVITY REPORTS DIRECTLY TO HIM FROM NOW ON. He will go through it all, edit it into report format and forward it on to us for publishing in the next available issue. Likewise, all AWARD APPLICATIONS for USATVS Certificates will be processed through WA0NKE.

### FOR THOSE WHO ARE FAX'ING....

Remember the days when you could hardly find a FAX machine in your area unless you followed the trail of burnt carbon emitting from some Hams QTH? Now it seems, they're everywhere! A number of you have been sending us FAX messages, schematics and articles. We have added a couple NEW numbers for improved access here at SPEC-COM. Mike KAOJAW up at our Dubuque MAIN Administrative Office, is planning on adding a FAX board to his new IBM (clone) 386 computer system. We hope to get an AEA FAX MINDER unit which automatically senses a VOICE or FACSIMILE IMAGE signal. Once installed, use the regular (319) 557-8791 number. We are now setup with a 2nd FAX number at our Printers in Dubuque (319) 582-0335. This is where very last minute AD changes, etc. should go. NEVER SEND PHOTO reproductions unless it is just for a preview look-see. Please mail those. We now offer a 3rd FAX ACCESS to our Editor's/Advertisement Office here in Clarence. Hours are 8 am. to 4 pm. daily - not available on weekends. Send to (319) 452-3805. Be sure on all FAX material - to include WHO it is designated for and mention SPEC-COM somewhere on the material. It costs us \$1.00 per copy (in Clarence and at our Printers) so please DON'T SEND ANY JUNK! It's always better to lick a stamp unless a deadline requirement is trying to be met.

### PLAN TO SPEND DAYTON '91 WITH US!

We have some pretty neat programs and speakers lined up this next year at DAYTON at our evening ATV WORKSHOP sessions. I don't want to tip my hand just yet, but we are going to do something NEVER BEFORE accomplished at the years best HAMVENTION on Friday Night! It will be a once in a lifetime special event that YOU will NOT want to MISS out on! IF YOU JUST WANT TO "PARTY", THEN GO ELSEWHERE. IF YOU WANT TO PARTICIPATE, BE ENTERTAINED & EXPAND YOUR TECHNICAL KNOWLEDGE BY LEARNING SOMETHING WORTHWHILE - THEN PLAN ON COMING TO THE RAMADA NORTH!



## W6HDO GETS ANOTHER ATV QRM LETTER

Copies of the last issues published USATVS comments, regarding the Cliff Buttschardt ATV/432 SSB QRM incidents, were sent to a number of people and organizations of which one of them, JOHN BEANLAND of SPECTRUM INTERNATIONAL, INC., has now also responded. His letter is published in this issue for ALL members to read. John wrote a "positive" and most helpful response letter unlike some other responses in which W6HDO probably just filed in the round container.

## MORE PROJECTS COMING IN '91!

Included in this issue, is one heck of a great, two-part, well written, complete, "BUILD THIS ATV TRANSMITTER" article by Rudolph Graf KA2CWL that was originally published in two issues of RADIO ELECTRONICS! We have a good working relationship established with Christine Estrada (Secretary) and Larry Steckler (Editor-in-Chief) at R.E. and they were both gracious enough to send us the original artwork for better reproduction. Watch for more such exchanges in future issues! KA2CWL's articles have been published by TAB and SAM BOOKS and you might have seen his name along with his partner William Sheets published in other electronic publications. Now they are also with us!

## TOUCHTONE (tm) ROTOR INTERFACE

Looking for a way to hook up one or two rotors with a touchtone decoder interface so that you can remote control a directional interface for an antenna at an ATV Repeater site or somewhere? Contact Kansas City ATV Groups' Jim Aulgar KA0OXO in Grandview, MO.. He built a neat operating system for the WR0J ATV/R site. We are after Jim for an article about it. The Draw Bridge, Inc. of San Diego, CA. is advertising a new Pan/Tilt/Zoom apparatus that is controlled in movement by telephone touchtone controls (see ad). We are on top of it and will bring you a full article in an upcoming issue.

## P.C. ELEC. 'MISSING PARTS' ALERT!

Have you recently received a PCE VRC-45 TV Demodulator board and had trouble getting COLOR to pass appropriately? About 20 of these boards, apparently have went out to PCE customers with "parts missing" that were not placed and attached to the main circuit board (coil, capacitor and other parts). The missing parts are vital in properly handling the 3.58 MHz. colorburst signal that flows through the circuit. Call Tom O'Hara W6ORG about this directly if you suspect you have a problem in this area.

## MORE VIDEO BULLETIN BOARD SOFTWARE!

Move over RADIO SHACK TRS80 Color Computer and MUL-T-SCREEN ATV Bulletin Board Software (from HRS) - you have a competitor! ENGINEERING CONSULTING of Brea, CA. is releasing their CATV VIDEO PAGE GENERATOR software system to the growing Amateur TV market for the COMMODORE 64 Computer at \$189.95 retail. A C64 EPROM CART plugs into the computer, performs all display and editing functions and provides NTSC HI-RES video outputs to drive monitors or FSTV transmitters. The CART features AUTOBOOT, 100 pages, scroll, flash and even an accurate TIME-CLOCK! Version 2.0 works with an inexpensive \$79 modem interface and if you have dual system on both ends of a phone line - you can control everything from a remote site (great for distant repeaters)! We have one of these units up and running at the Maquoketa, Iowa M.A.T.S. ATV Repeater system and it works great! An extensive article about this system is elsewhere in this issue written by our resident technical reviewer Ron Hranc NO1VN.

## COMET MINI-METERS FROM NFG

An interesting ad in QST and word from Merle Reynolds W9DNT who purchased one of the small, but rugged looking, COMET personal mini-meters (watt and SWR meters) that they work well at a reasonable price (\$89.00)! Available models include: CM-200 if for 144-150 MHz., CM-300 for 200-300 MHz., CM-400 for 420-460 MHz., CM-900 for 850-950 MHz. and CM-1200 for 1250-1350 MHz. There are two range scales: 10 watts and 120 watts at 50 ohms. Write to: 1275 North Grove Street, Anaheim, CA. 92806 or call (714) 630-4541.

## 'HOT' COLOR-TV/VIDEO MONITOR FOUND!

DAMARK INTERNATIONAL, INC. of Minneapolis, Minnesota is distributing some neat looking, nationally advertised, "special edition" CRAIG 5" color TV sets (with carrying handle, car cord, whip antenna) that has brilliant color, excellent sensitivity, tunes in 439.250 MHz. directly on UHF (as well as all commercial VHF/UHF TV channels) - AND - acts as a VIDEO/AUDIO INPUT and OUTPUT MONITOR (RCA PHONO JACKS located on top not in back!) for Camera, VCR or FSTV interfacing! The units have 3-way power and are 7 inches wide by 5 1/4 inches high by 11 inches deep and weight only 5.25 lbs. UL Listed and approved. Ask for the CRAIG Model P501 when ordering - no substi-

tutes. One year warranty. \$434.95 list - they were selling in the OCTOBER 1990 catalog for \$179.99. Grab one quick guys or circle this paragraph for your XYL to read for Christmas giftgiving! Ask for catalog item B-462-148387. Add \$7.00 shipping/handling. Call toll-free for orders at 1-800-729-9000. RADIO SHACK has a new MINI-LCD Color TV model now out called a POCKETVISION-24. With a slightly larger screen than their 22 model, this unit is said to cover the UHF ATV frequencies as well. Anyone bought one yet? Thanks to Merle Reynolds W9DNT for the hot tip on the CRAIG TV's.

## MIKE BARLOW of BATC 1929-1990

With the arrival of the latest BATC CQ-TV issue (August 1990) came the sad word of the passing of CLUB FOUNDER Mike Barlow G3CVO/T. Mike was instrumental in many of the founding activities with The BATC group in England. He died May 14th, 1990 in Canada.

## ATTENTION COMMERCIAL ADVERTISERS!

You can now ADVERTISE your message(s) on the new EC BBS! A special page MENU section has been created just for specialized communication advertisers on the Iowa National telephone BBS system (319) 582-3235. Our office in Dubuque is mailing out a letter notice about this very inexpensive EXTRA PROFIT offer (just \$5 per month!). Call Bill Fay KA0FDI (between 4 pm and 8 pm. daily) for more details: (319) 588-3653.

## LASER PRINTER ON-LINE!

The "JAW" and I purchased a brand new HEWLETT PACKARD LASERJET II PRINTER for the company. This is the first issue COMPLETELY LASER TYPESET by our own doing! It took a few days to "catch on" to complete operation of the fancy unit, but now we are PRO'S at it. We also purchased a PRO-COLLECTION font cartridge that gives us 65 different fonts and sizes to play with. We will be experimenting with some of these in the next few issues. Do you like what you see? We have almost all of our inputting authors on the EC BBS, so life is much easier getting the BIG job done every other month!

## DAYTON ATV RPTR GOING HORIZONTAL???

Inside sources tell me that the DARA ATV Repeater in Dayton might be flipping polarizations "to go with the flow" during a planned move and rebuild of the system. Some new leadership has taken over the club with a President who is ATV active! Fast Scan gear is even being talked about being installed in the famous DARA AMATEUR RADIO VAN. Maybe next year - we all might be able to work the system from our MOTELS?

## FM VIDEO SUPERIOR TO AM?

Despite the word being put out by some stubborn AM FOREVER believers, the professional industry seems to feel just the opposite about the superiority of an FM TV signal versus that of an AM one. In the July/August 1990 issue of CCTV MAGAZINE (page 6 and 8), writer Sanford Green, President of WIRELESS TECHNOLOGY, INC. and 15-year veteran of the Security Market Industry wrote in an article entitled; "RADIO FREQUENCY TRANSMISSION SYSTEMS FOR VIDEO" the following: "The RF system pioneered by WIRELESS TECHNOLOGY INC. uses a Frequency-Modulated carrier in the range of 905-928 MHz. to deliver video with a high degree of picture clarity. In this frequency range, the signal penetrates buildings, walls and foilage, resulting in greater system flexibility. In addition, the use of FM frequencies is a major step forward because FM provides greater signal strength, i.e., greater range, no distortion of picture quality, immunity to other types of signal devices, truer color and black and white shading and greater range at lower power than does AM." The USATVS took a positive stand on the experimentation of FM signals for ATV applications 3 years ago and those who have investigated it have found what Sanford Green is saying to be quite true. Let's keep the interest and momentum going toward ATV FM signal development!

## A SPECIAL THANKS IN CLOSING...

As we near the end of this year, I want to personally thank Mike Donovan KA0JAW for climbing onboard. As many of you know, I tried to run this publication all by myself for 8 years (longer than any other publisher/owner). I found out that even though we are pretty small potatoes in the Amateur Radio publishing world compared to QST, 73 or CQ, the very important work that this job requires - is simply too much for one person. Try as I did, I could not do it all and do it ALL well. I was admittedly burning out (especially after a barrage of highly unethical and harassment tactics by a couple jealous & immature individuals). You really learn who your true friends are when they realize what is happening and step forward to help you out. Mike Donovan did just that. He quite unexpectedly put his money and time where others chose to criticize and bad mouth. One year later, the Journal is healthy, growing and alive again. Now "WE" are back on top. Happy Holidays! -WB0QCD



## "CLUBS, CONTESTS and SPECIAL EVENTS!"

Report filed by:

Dale Lam WA0NKE  
5045 North Kensington,  
Kansas City, MO. 64119

Pictured right: ARRL Life Member  
WA0NKE and his modern ATV station  
setup including Weather Radar.



### USATVS Year-End State Section Manager Reports Now Due!!!

Dale Lam WA0NKE can be also reached on the new E.C. BBS in Dubuque, Iowa (319) 582-3235. Please call-in or mail your local ATV Club and area activity reports (including State Section Managers!). Dale can be reached at home in KC Missouri at (816) 252-5102.

#### SPECIAL ACTIVITIES:

##### Pennsylvania Section Report

**John Shaffer - W3SST of York, Pa., USATVS State Section Manager** sends this report: "The 2nd Annual Keystone VHF Club Inc ATV Seminar was held Saturday September 22, '90 at Wynns Homestead Restaurant. This is held each year in conjunction with the York Hamfest. Thirty four were in attendance this year. The theme was "Getting on ATV Cheap". Buzz Kutcher started the program describing his entry into ATV. This was followed with presentations of various types and makes of equipment available. A video tape prepared by WA3USG - Dick and N3GKP, of local ATV history was viewed. Ring, Loop, and Quagis were displayed. This led into a very interesting presentation of "Stacking Beam Antennas" presented by John Beanland G3BVU of Spectrum International Inc., Concord, Ma. John did his usual fine job of presenting a difficult and complicated subject in a manner all could understand. The BRATS (Baltimore Radio Amateur Television Society) and PARA (Philadelphia Area Radio Association) were well represented. The ATV repeaters in York and Philadelphia continue to operate with York inputting on 439.25 MHz and outputting on 923.25 MHz (horizontal IN and vertical OUT). PARA in Philadelphia is 439.25 MHz IN and 421.25 MHz OUT with an additional output on 923.25 MHz. These are all horizontal. New interest has surfaced in the area and we expect to have activity in Hanover, Pa. and additional stations in Carlisle, Pa."

##### Great Lakes Section Report

**Alan Smith - WB8YOB, USATVS Great Lakes State Section Manager** reports growing ATV activity in Genesee County (Flint, Mich. area). The active ATVs in the area are K8NOZ, N8NE, KC8EP, N8CHA, WA8IRL, KD8YX, and WB8YOB. Additional ATV activity is in Detroit-Windsor area, Lansing-Mason area and the Ann Arbor area. The local ATV group went to the 3rd District EC meeting held in Saginaw, Mi. (about 35 miles north) to demonstrate the advantages of ATV in disaster situations. To avoid the possibility of having equipment problems, they took enough gear to fully equip three ATV stations on 70 cm. They operated mobile and portable stations to show the capability of fast scan ATV to the attendees. They answered questions about range, equipment, cost and spectrum management. Alan reports, "N8JAT, a member of the EC group that voiced a desire to get a split band ATV repeater operating in the Saginaw area, complained that he had been turned down by the area frequency coordinator for split repeater operation. This came as a shock since our group has plans to put into service such a repeater system." Additional discussion concerned the possibility of using ATV for Skywarn spotting and its potential for eliminating ambiguous descriptions. **Alan says,** "... our group is near completion of an ATV repeater with an input of 439.25 and an output of 1253.25 MHz." "Since all of the known ATV stations in Michigan have adopted horizontal polarization, we are using the K4NHN 'Rib Cage' omnidirectional antenna for the input (expertly crafted by N8NE) and an 'Alford Slot' antenna for output."

##### Kansas City, Mo/Kan

Weddings are always fun, but in this case it is most notable. On September 8, '90 Tim - KA0MXW and Kathy - KB0GRA were married.

Before I get into what's happening around the contry, I want to say a few words about USATVS AFFILIATION. Affiliating YOUR ATV CLUB or GROUP with the 1983 formed, United States ATV Society national organization is very important. Doing so, officially recognizes the USATVS as your chosen "REPRESENTATIVE" to speak, act and legislate on your behalf on matters pertaining to The ARRL, FCC or other such organizations. Who else has put together such an organization to defend ATVer's rights and promote our beloved video mode? No one. We must give The USATVS our total support! How do you become an affiliate? At your next Club meeting, bring it up for discussion as new business. See how others feel. Unlike the ARRL that requires 51% of their affiliate club members to subscribe to QST. The USATVS has no such requirement for SPEC-COM. Get "your" club to affiliate!

### "CLUBS, CONTESTS & SPECIAL EVENTS!"

By Dale Lam - WA0NKE

This new column is dedicated specifically to ATV club activities. I will also include information about upcoming contests and special events and report on events recently completed. **I will, of course, need your help to do this. Please add me to you club newsletter mailing lists.** Send me the latest copy or just write a letter or postcard as to what's happening in your area! I am a regular weekly check-in on the new EC BBS - so you could get in touch with me there. Anything that already has been, or is, sent to SPEC-COM or The USATVS is being forwarded on to me for reporting in this column. I hope the information you send will be useful to other clubs as a source of good activity ideas. You and your club will get valuable "free press" and individual recognition by being published in this new column. Besides, I don't want to be sitting here in my little corner of the Midwest trying to invent information to write in this column.

**Allow me to introduce myself,** so that you can feel like you know me a little, and know that I won't bite or scratch. I am 44 years old and have been a ham since 1962. I was a freshman in high school at the time my first ticket came. I was more proud of getting my call (WNSBQQ) than of anything else I had ever done.

I had been an avid shortwave listener ever since I got my first real short wave receiver. It was a Hallicrafters S-107. What a beauty. I earned it by taking care of the animals on a small plot of ground that my dad bought. Dreams of the great receivers of the time filled my hopes, however when we went to the radio/TV store the first lesson I learned was that I could not start out at the top. My father, however, was shocked to find that the cheapest receiver available was the S-107 at \$95. With promises from the store owner that it would be a good starting receiver, we bought it.

It proved to be a great starter. From 10 meters through 80 meters, the bands were full of CW and AM stations and a few Donald Duck sounding ones. International broadcasters were fighting for every scrap space on my dial. I had magically been "turned on" to radio. The magic hasn't gone yet, even after 28 years.

**Today:** It is hard to believe the changes I've seen in the technology of ham radio. From the Icom-725 HF 100 watt transceiver, the Kantronics KAM TNC, AEA Amiga Video Terminal slow scan TV and FAX interface, Amiga 500 with 2.5 mega bytes of RAM, to the Wyman WR-450 ATV transceiver. These things could only have been dreams back in '62, but are standard in many ham stations now. My greatest interest now is amateur fast scan television, with its challenge of getting a good looking signal across the country or just across town.



They were married by a ham priest Father Jim - WA0FMB, and it was shown on the ATV repeater for all to see. ATV planning and equipment were provided by Gary - KG0R and John - WR0J. Helpers and camera operators were Bob - N0JRB and Dale - WA0NKE. Only 30 minutes was available for equipment setup, due to the wedding being held after the regular 5 o'clock mass. In that short length of time 4 cameras, various microphones, audio and video control center, and transmitter and antenna were installed and cabled. The hams that were in attendance could view it on the WR0J repeater on 426.25 MHz. This was fun for all who participated. Who's next for the "Wedding-Cam"?

#### Kansas City

I'm also proud of the KCATVG (Kansas City Amateur Television Group), of which I am a member. We started the club in January, 1990 and have grown to 42 members in 10 months. We've been able to acquaint other hams and non-hams in the K.C. area to the delights of ATV by the hard work of a number of members. We have a 24 hour weather radar and ATV repeater thanks to KG0R - Gary and WR0J - John. Mike - KD0FW, and his many supporters and helpers, have challenged us with balloon flights to track and find. Balloon-Cam One launched on July 7, '90 even had live color video. On Saturday October 20, '90 at 9:00 AM KD0FW launched a small balloon with a two meter beacon. With an expected height of 30,000 to 40,000 feet, it provided the "T-hunters" some real fun with about an hour of flight time. WB0QCD in Iowa, nearly 300 miles away, heard (and reported) our computerized "COME AND FIND ME" message sent on 144.340 that Saturday morning at S3 "clear" signal strength for about an hour starting at 10 am.!

#### Maquoketa, Iowa

**KAOIAW reports:** that things have been moving along slow but steadily at the new M.A.T.S. ATV Remote Transmitter and Repeater site located 10 miles north and west of Maquoketa, Iowa. The "hoped for" integrated touchtone decoder unit never materialized and a new 10-channel, multi-featured, MICRO-COMPUTER CONCEPTS RC/VS-1000 19" rackmounted unit (featured in the last issue of SPEC-COM by N9EE) is now being installed to run the system. A WB8ELK Video ID'ER and PCE VOR HSYNC and XMT RELAY are housed in the controller unit. Touchtone controlling is now being done by radio on UHF frequencies with a devoted telephone landline backup. An OPEN HOUSE was held in July. The system will be unique with several "firsts" in the region including a touchtone steerable, 88-element JAY-BEAM and outside camera system and selectable SLOT OMNI or BEAM DIRECTIONAL radiation patterns. On the beam array, the system has been seen in Cedar Rapids, Chicago and down in Missouri covering several hundred miles. Newly acquired items include: MICROWAVE FILTER Company duplexers, a modified GOLDSTAR VHS VCR Player, a new EC VIDG C64 cart ATV Bulletin Board and a 60-Amp 19" rack-mounted ASTRON Power Supply. Retransmitted "real-time" NOAA Weather Satellite pictures into the system is becoming more a reality with the arrival of a special demodulator and dish system in Dubuque. A 1200 MHz. WX RADAR link is also planned from Dubuque. A number of frequencies are used by the group including 144.340, 144.370, 147.450 and 146.895, 147.060 repeaters on 2 meters and two unmentioned frequencies on 220 and 450 MHz..

#### Eastern Florida

From Don - K2AAA and Ladd - W2KGV comes information that the Treasure Coast Amateur Television Network is increasing in members as evidenced by the attendance at the monthly Saturday Morning Brunch. This group represents hams from as far north as Merritt Island, near Cape Canaveral, to as far south as Miami. Cal - N4MYI told about his trip to Wisconsin, with mobile ATV, in which he had a contact with a station in Indiana. This led to an enjoyable "eye ball" QSO. Plans are being made for an ATV repeater to be located in Fort Pierce on the 911 tower. Coverage is hoped to extend to the Stuart area. Tests are being conducted with the aid of the Sheriff's Department, for ATV equipment to be mounted on the helicopter.

#### Deland, Florida

**Skybeacon-2 was launched on Saturday September 15, '90** from Deland Municipal Airport. The StratoNet Florida group has had a success with this venture. The flight lasted two hours and 36 minutes, and included a 1-watt two meter FM beacon on 144.34 MHz and a 434 MHz live FSTV transmitter. Initial reports mention that the two meter beacon was heard as far away as Asheville, N.C. More detailed information about the flight of Skybeacon-2 has been requested by USATVS for future publication.

#### Dallas/Ft. Worth, Texas

**KG5VX - Andy Ross informs us** that a new ATV group has been born in the north Texas area. It is called NTSC (North Texas Synchronization Club). The club was formed to manage a repeater project originally conceived by Andy - WY5V and Ken - N5EEX. Through a great deal of hard work the equipment was installed at Cedar Hill on the KTVT-TV

tower at 1270+ feet. The operating frequencies are: input - 1277.25 MHz and output - 421.25 MHz. Both input and output use horizontal polarization. Initial problems were encountered by trying to use a homebrew interdigital filter, but was solved by using one from Spectrum International. The filter was required to keep commercial radio and TV signals out of the equipment. An article detailing the repeater system will appear in a future issue for USATVS.

#### Marysville, Ohio

The Union County Amateur Radio Club now has a truck setup with mobile ATV equipment. It was the generous gift from a local TV station and had formerly been a RAPIDCAM for them. It is now repainted with the letters "HAMCAM" on the side and "Amateur Radio Television Unit W8BJN-TV Channel 13.5". I can't wait to see it at Dayton! They are invited to "show it off" at the RAMADA INN NORTH (I-75/I-70) Little York Road Exit - where most of the ATV crowd gathers on Friday and Saturday evenings...

#### San Angelo, Texas

From Tom Earnest - W5VFO comes the following information: "I am working on an ATV repeater for the San Angelo area. Input will be on 439.25 and output on 421.25. The location is not known yet. We will also have one, and possibly two, remote cameras."

#### CONTESTS

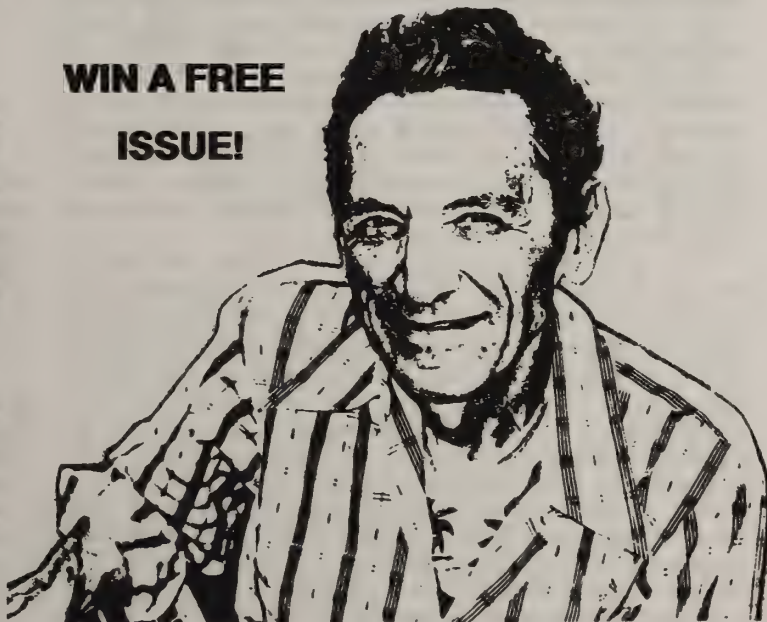
**The 1990 North American FSTV-DX Contest is now history!** I understand WB0QCD is publishing the results of this annual event elsewhere in this issue so I won't comment too much about it except to say that it really brought about a lot of new activity here in the Kansas City area! It was certainly a lot of FUN to operate. Another national FSTV contest is planned for March and I will bring you the details as soon as I can get them.

**The Indiana "TOP GUN" ATV Contest** began September 1st and runs for the rest of the year (I think). Four class categories exist: Class 1 up to 5 watts, Class 2 up to 25 watts, Class 3 up to 100 watts and Class 4 over 100 watts. All contacts must be "two-way" on 420 MHz. or above. No Repeaters or Balloons. For exact details, write to: Indiana ATV & UHF Club, 6455 Madison Ave, Indianapolis, IN. 46227.

#### SPECIAL EVENTS

**Western Vision ATV Club from DENVER, Colorado plans an ATV Balloon LAUNCH November 18th!** Backup date 2 weeks later (Dec. 2nd). Video: 426.250 MHz. 1-watt PCE KPAS, live Camera and WB8ELK ID board, Horizontal with Little Wheel antenna. Audio: CW ID 2 Meter FM on 147.555 MHz. (local FOX HUNT channel). 40 Meters LSB Coord: 7.232 MHz. Callsign: WB0TUB. Launch scheduled for 9 am. local time. Jack Crabtree AA0P Event Coordinator. More details in Special Bulletin Area (I) of ECBBS. Point to Denver guys Nov. 18th or Dec. 2nd! -WA0NKE

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# Fast Forward Video

## Video and TV Questions/Answers

with **RON HRANAC NØIVN**  
**WESTERN VISION ATV NETWORK**  
 466 Pluto Court, Littleton, CO. 80124



**Ron Hranac**

*(EDITOR'S COMMENTS) - A hearty congratulations to NØIVN; Coaxial International, Inc., a Denver-based consulting firm specializing in international cable television management and consulting, announced that Ron joined the firm on September 17 as Vice President of Engineering. He also will continue to be affiliated with CT Publications Corp., where he has been named Senior Technical Editor.*

Q - If the lower sideband of a double sideband ATV signal is removed or reduced significantly with a VSB filter, will the real transmitted power be seen on a BIRD wattmeter?

**A -** Probably not. As was discussed in this column in the September/October 1990 issue of *SPEC-COM*, a BIRD wattmeter will be accurate only with CW carriers, and the presence of video modulation will make the BIRD's readings relatively meaningless. The contribution of upper and lower sidebands to the overall output power of a TV signal is fairly insignificant, especially considering the levels at which those sidebands operate.

Let's consider the effect of just the 4.5 MHz audio carrier. In this example, we will assume that output power measurements are being made with a *true* power meter that reads in dBm. If we start with an unmodulated video carrier and no other carriers, a 1 watt transmitter connected to the power meter will read +30 dBm. Mathematically we can convert from watts to dBm with the following formula:

$$\text{dBm} = 10\text{LOG}_{10}(\text{power in watts}/0.001).$$

In DSB operation, the presence of upper and lower 4.5 MHz audio carriers will cause the power meter to read a slightly higher *overall* output power, the amount determined by the actual levels of the carriers. If the video carrier remains at +30 dBm (1 watt) and both of the audio carriers are at -15 dBc (+15 dBm or 31.62 mW each), the power meter will read an overall output power of +30.27 dBm, or 1.06 watt. With the two audio carriers operating at -20 dBc (+10 dBm or 10 mW each), the power meter will read an overall output power of +30.09 dBm, or 1.02 watt. And if the two audio carriers are turned down to -25 dBc (+5 dBm or 3.16 mW each), the power meter will read an overall output power of just +30.03 dBm, or 1.006 watt.

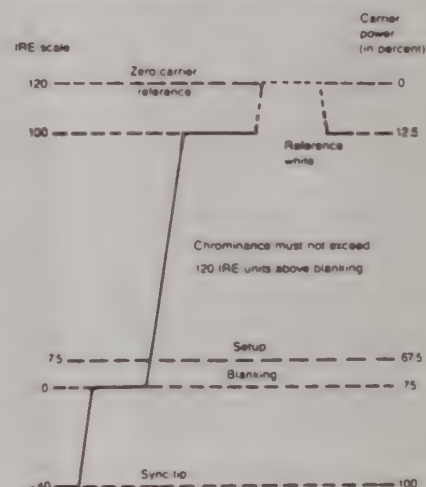
If a VSB filter is installed on the transmitter's output (assume the filter has no insertion loss in its passband), the removal of the LSB 4.5 MHz audio carrier will have minimum impact on the power meter reading. Again assuming a +30 dBm (1 watt) video carrier in all cases, the presence of just the USB 4.5 MHz audio at -15 dBc will result in a power meter reading of +30.14 dBm, or 1.03 watt. With the audio carrier at -20 dBc the power meter will read +30.04 dBm (1.01 watt), and at -25 dBc the reading will be +30.01 dBm, or 1.003 watt.

In the real world, you likely won't be able to see these small changes on a BIRD wattmeter. With video modulation present, the BIRD would read lower anyway (even though the PEP has not actually changed). And installing a VSB filter will introduce some insertion loss, perhaps a couple dB.

Q - Do sync stretchers really help? I adjust mine up and down but no one seems to see any viewable difference.

**A -** Figure 1 shows the relative levels of sync, video and zero carrier in IRE units (a baseband video measurement scale) and percent of carrier envelope power. In barefoot operation a sync stretcher is normally unnecessary, assuming your transmitted video-to-sync ratio remains reasonably close to 100 units of video

### Relative levels of sync, picture and zero carrier



**Figure 1.** Relative levels of sync, video and zero carrier.

to 40 units of sync. But when you transmit your ATV signal through an external amplifier, the inherent non-linearities in the "linear" amp will usually result in some amount of waveform clipping, which will compress the sync amplitude. If this sync compression is severe enough, the video-to-sync ratio will be upset and cause some TV sets to lose synchronization when viewing your picture.

A sync stretcher is essentially a predistortion circuit that when properly adjusted, increases the amplitude of your video signal's sync pulses by an amount equal to the compression that occurs in the amplifier. This will result in a correct video-to-sync ratio after the amplifier.

Our Denver ATV group uses an interesting but effective technique for adjusting each operator's equipment. We monitor each transmitted signal at the repeater site, using a waveform monitor at the video output of our 70 cm receiver (which actually is a CATV demodulator). We then aim a camera at the waveform monitor display, and transmit that image on the repeater's 23 cm output. Each user can then see his own transmitted video waveform, and make the necessary sync stretcher adjustments to achieve 40 IRE units of sync relative to 100 IRE units of video.



Q - I can slide my 4.5 MHz frequency control in and out of the passband of other ATVers' TV sets. What standards can everyone in our group go by so that we all have our transmitters lined up together?

A - There really is no shortcut for achieving the correct intercarrier frequency separation other than to use a frequency counter. Some ATV transmitters have an internal 4.5 MHz test point, and that should be monitored with an accurate counter while you adjust the frequency control so that your audio carrier is within one or two kHz of 4.5 MHz (check with the manufacturer for details).

If you are on good terms with your local cable operator, you may be able to borrow a *tuned frequency counter* (Texscan/Trilithic model TFC-450 or TFC-600) that has an intercarrier measurement function built in. The Texscan/Trilithic counter also includes a modulation stripper, so that accurate video carrier frequency measurements can be made even with modulation present. This type of counter allows direct measurements at RF, rather than having to find an internal test point. Just be sure you use an external 20 to 30 dB attenuator between your *barefoot* transmitter and the input of the counter, or you may end up buying a new counter (they cost several thousand dollars each).

Another technique involves connecting your barefoot ATV transmitter -- again through an external 20 to 30 dB attenuator and with no modulation -- to the low frequency input of a standard frequency counter that has two inputs (one for signals below 100 MHz, the second for signals above 100 MHz). The presence of the video and audio carriers together will generate 4.5 MHz distortion products in the counter's front end, which represent the transmitter's intercarrier frequency separation and can be measured with the counter.

Q - Are PL-259 connectors really that bad for use on UHF? Why are type N connectors better? Can BNC or F connectors be used for RF?

A - As the frequency of operation increases, components such as connectors begin to physically be a significant portion of the wavelength of operation (greater than 1/100th of a wavelength long). If a constant impedance is not maintained throughout the length of a connector, it can represent a fairly substantial point impedance discontinuity in the transmission system. The resulting mismatch may be significant enough to cause a VSWR problem.

UHF connectors (SO-239 and PL-259) will work at UHF frequencies, but they won't work well. The design of this particular connector does not maintain a constant impedance throughout its length, and at UHF and above will have poor return loss. Why they are called UHF connectors I don't know; it's certainly not an accurate name.

Both type N and BNC share a similar internal design, so that they do maintain a constant impedance throughout their length. While a BNC connector can be used up to 1 or 2 GHz, the bayonet design does not lend itself to good shielding continuity after repeated use. A variation is the TNC connector, which uses a threaded interface and is suitable for use well into the microwave spectrum.

Type N connectors also have a threaded interface, but are more rugged and can handle higher operating power levels. The type N connector is probably the best choice for amateur use at UHF and above. Specialty connectors such as SMA are recommended for use in the microwave spectrum, although type N and TNC work well to 12 GHz and higher.

The F connector is used extensively by the cable industry, and provides good electrical performance to at least 600 MHz (if installed correctly), although its power handling ability is limited. Some expensive precision versions of the F connector will work well up to 1200 MHz or so, but these types generally are not available to the amateur community. Besides, F connectors are designed for 75-ohm applications.

Keep in mind that there are both 50-ohm and 75-ohm versions of type N and BNC connectors; make sure you use the right ones.

Q - I live 40 miles away from our 427.25 MHz output ATV repeater, and was tuning through the 70 cm spectrum with my SSB rig while the repeater was transmitting. I easily found the 427.25 MHz video carrier and 431.75 MHz audio carrier, but also found what I believe to be some kind of spurious signals. For example, near the video carrier I received fairly strong signals at 427.266, 427.281, 427.297, 427.313 MHz etc., and above the audio carrier noticed signals at 431.766, 431.781, 431.797, 431.813 MHz, etc. up to nearly 438 MHz. I confirmed the repeater as the source; what's going on?

A - What you have found are not spurious signals, but are horizontal sidebands spaced every 15.734 kHz coming out of your repeater. These are a normal part of video transmissions. The horizontal scanning rate in color NTSC video is 15.734 kHz (15.750 kHz in monochrome video), resulting in a little over 280 horizontal *luminance* sidebands located every 15.734 kHz between

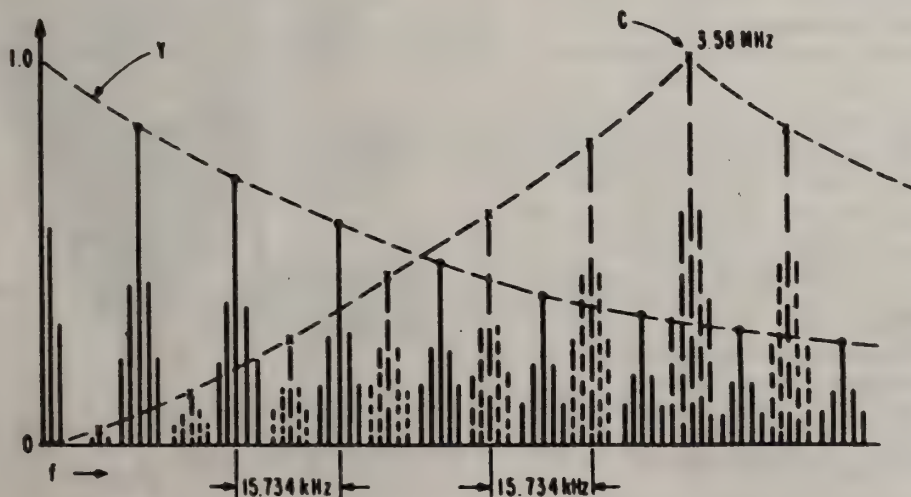


Figure 2. TV horizontal sidebands (not to scale).



the video and audio carriers. With color transmission, additional chrominance sidebands centered around the 3.58 MHz color subcarrier also are spaced 15.734 kHz apart, but are interleaved between the luminance sidebands (see Figure 2).

Normally you should only find horizontal sidebands with any significant amplitude between the video carrier and the 4.5 MHz sound carrier. With DSB transmission, they would appear on both sides of the video carrier. As with most so-called linear amplifiers, yours is apparently operating a bit on the non-linear side, creating additional "sidebands."

It sounds as if your repeater transmitter needs a good VSB filter installed after the power amp. I'm a little surprised that you can pick up the sidebands above the repeater's audio carrier from 40 miles away; it's likely that 70 cm weak signal users in your area can probably receive those sidebands, too.

Q - I'm using a homebrew 70 cm Yagi antenna for ATV, but don't get the performance I think I should. Weak signals are especially a problem, often with no color and poor sound (received and transmitted). Any suggestions for improvement?

**A -** I suspect that your antenna design is one that originally was for 432 MHz SSB operation. Many Yagi antennas are optimized for use on a narrow range of frequencies, but your ATV signal is anywhere from 6 to 12 MHz wide. To get better performance you need to use an antenna that is designed specifically for very wide bandwidth operation. Most commercially-built ATV antennas

provide low VSWR and high gain over a 20 to 30 MHz bandwidth. ATV-specific antennas for 70 cm are available from AEA, Cushcraft, KLM, Lindsay, Rutland Arrays, Spectrum International and Tonna.

UHF and higher frequencies require the use of low loss coax between your transceiver and antenna. Cables such as RG-8, RG-213 and RG-214 are too lossy for runs over 30 or 40 feet. Belden 9913 (or equivalent) and possibly even something like Andrew 1/2 inch or 7/8 inch hardline will be necessary for longer runs.

A mast-mounted low noise preamplifier may be helpful with very weak signals. Make sure it is a 70 cm-only design to reduce out of band interference; it also should include provisions for T/R switching. Your transmitted signal can be aided by an external power amplifier. If you do use a linear amp, it *must* be one that is ATV-compatible or has been modified for ATV operation.

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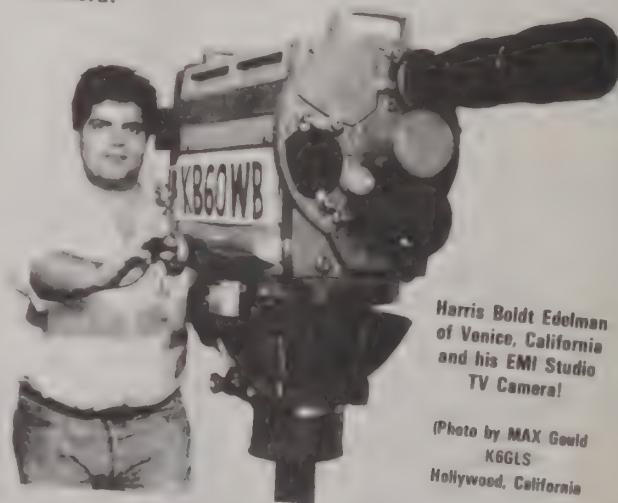
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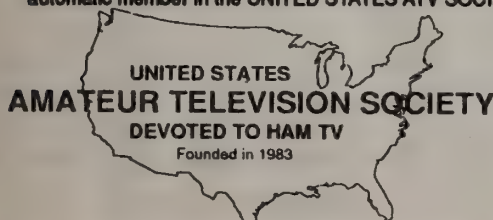
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## THE GREAT AMERICAN ATV SHOOTOUT! AEA FSTV-430a, WYMAN WR-450 and PCE TC-70 TRANSCEIVERS COMPARED

**[EDITORS COMMENTS]** Our SEP/OCT '90 SPEC-COM issue stirred quite a bit of interest regarding new M.A.T.S. and KANSAS CITY ATV CLUB comparison test studies of various ATV downconverter receivers now in the marketplace. Curiosity levels were raised substantially by many ATVers. These comparison tests it seems, has been "the hot" on-the-air topic subject of discussions for many Fast Scan TV Groups around the country.

In this issue, yet another unsolicited filed report is presented to the membership by Steve Carroll WV0J of The KANSAS CITY ATV CLUB. WV0J was intrigued by fellow club member Dale Lam WA0NKE's "WYMAN WR-450 VS. PCE TC-70" initial article. He countered with an article of his own, which was also published in the local Kansas City ATV Club "CHANNEL ONE" Newsletter (August 18th VOL. 1 NO. 8). Like the M.A.T.S. Group did in Iowa, Carroll also compared a WR-450 to not one but two PCE rigs (one mast-mounted unit) under similar test conditions and in addition, added a comparison study of AEA's new FSTV-430a transceiver.

Our Staff Chief Technical Writer, Ron Hranac N0IVN of the Western Vision Colorado ATV Group, has just completed a comprehensive, no holds barred, "all present ATV rigs on the market" (PCE, WYMAN, TD SYSTEMS, AEA) serious "MEASURED" LAB TEST comparison study which will we present to you in our January/February 1991 issue. Watch for it!

What is quite interesting about all these recent tests, is that while some in the country have thought or openly complained of "bias and opinionated testing and reporting" by the first few groups - others are now doing independent tests of their own and are coming up with quite similar results! You can, and perhaps should always have a little doubt about the reported findings of one individual or group on a certain subject, but when verified results start happening the same all around the country - you can pretty well take it for the truth as legitimate FACT.

Today, the world is a much different place and so to, is ATV competition for the consumers dollar. Fast Scanners are getting "smarter" in their elective buying choices by comparing features and actual test evaluations. The USATVS Journal has responded to this new interest by publishing learned results (whether good or bad) for our sought after and valued commercial advertisers. A publication MUST do that to keep credibility with its readers.

It is a tough line to hold - to be "honest" to readers and yet not do unintended marketing harm to those manufacturers who we all need so badly in a minority interest part of the hobby. We elected, long ago, to be as fair and responsible as possible on presented opinions but let the chips fall where they may. "Truth" by evaluation and comparison takes precedent over any publishers account liability. Those manufacturers so criticized, who "listen" to what their customers and buyers are saying to them - will greatly benefit by improving the products performance or given features in a future model or design modification. Those who don't want to "listen" will eventually fall by the manufacturing wayside with lost sales. "We've learned that too" in the publishing business!

Presented author's articles are, as stated in our PUBLISHERS STATEMENT (page 3), strictly the opinion of the writer and reviewer and are not necessarily that of the publishers or magazine. If we were to EDIT OUT or NOT ACCEPT submitted manuscripts sent to us by our readers and members, simply because we disagreed with the author on a certain subject - we wouldn't be much of a fraternal journal publication. Everyone has his/her own opinions on certain subjects and as long we run this publication - we will reflect those offered opinions, favorable or unfavorable to whoever.

WB0QCD



## THE GREAT AMERICAN ATV SHOOTOUT

by Steve Carroll WV0J  
Kansas City ATV Club

Quiet! Don't tell Dale that I am writing this article just before he arrives to help get CHANNEL ONE laid out. He thinks I completed this last week sometime and am just waiting on him to get the thing done! Ain't I sneaky...

What does that have to do with **THE GREAT AMERICAN ATV SHOOTOUT**? Not a darn thing, but it sounded like a great way to start an article. This article has one winner, one runnerup and one definite loser. In most categories, it isn't even close. If you wonder what I am talking about, it is the ultimate shootout between the **PC ELECTRONICS TC70-1**, the **WYMAN WR-450** and the **AEA FSTV-430a**.

I looked at them in the following categories: 1) **Receive**-this is broken down into sensitivity and out of band interference susceptibility. 2) **Transmit**-the most bang for the buck with the best "out-of-the-box" signal quality. 3)-**Audio-Sub-Carrier** generation (which one sounds the best over the air) and 4) **Workmanship**-how well is the board constructed. I am basing my opinion on personal experience, the article that Dale WA0NKE wrote in our newsletter and **SPEC-COM** and an article that came out in the August issue of 73 Magazine written by Gerald Cromer K4NHN and Hap Griffin reviewing the **AEA FSTV-430a**.

To start off with, the **RECEIVE** side of any piece of ham gear is the heart of the unit. This is where first impressions of the rig are made. The cosmetics can look like it got rolled over by a dirty garbage truck but if it receives better than others, it will start to look prettier as the minutes tick away. Now I don't have any fancy test equipment to show you how much noise floor something has or the shape of the output signal. I have to rely on others for that. What I can tell you is exactly what you will see out of the "band box".

Let me relate the relative strengths of each of the units. At present, my receive consists of a mast-mounted **PC ELECTRONICS TVC-2G** up about 65 feet in the air. I feed this with **RG6U** cable. I also have a run of **Carol C1180** (alias Belden 9913) running to the T/R relay at the antenna. Signals from the weather-radar run a constant **P4** to my **QTH**. When Neal KA8MMI and Charissa KB4BML first got their new **AEA** unit, I must admit to being anxious to welcome them to the **ATV** ranks just to get to try out the new rig! I wasn't disappointed. **The FSTV-430a performed as well, if not better than my mast-mounted PCE unit.** I then began to wonder about other units. I proceeded to hook up the **PCE TC-70-1** as I had hooked up the **AEA**. The results were disappointing. **The PCE was a good 2 P-units lower than AEA.** I tried tweaking the **PCE** for all she had but alas, no go. I wanted to back-up this finding with another unit so I hooked up **KA0LFT's PCE TVC-4G** and got the same results.

I noticed in the 73 article that Hap and Gerald stated; "Although we have no way to accurately measure the noise figure, receiver performance is identical in A-B comparisons to a **PC ELECTRONICS GaAsFET** downconverter that has been used for several years." Gerald is also the one that told me that if you don't have at least a .9 db sensitive downconverter, that is defective. Gerald, I respect you a bunch - but you are wrong on this one ole buddy. **I have yet to see a PCE unit come close to that figure or one to close to the sensitivity of the AEA.** **WYMAN RESEARCH's WR-450** is also a good one. From what I have seen at Dale's **QTH**, the **WR-450** unit would come a close second to the **AEA FSTV-430a** transceiver. (The **MATS** Group in Iowa submitted similar findings).

I can honestly say that complaints about **UHF-TV Channel 50** went down drastically when Dale went to the **WYMAN** and I enclosed my **PCE** unit in an all-metal **Hammond** box and moved it to the top of my tower. I did not notice **ANY** out of band interference from the **AEA**. We have, however, noticed in-band interference on all transceivers.

**The winner of the receive contest is the AEA (just like WB0QCD reported), hands down.**

The **TRANSMIT** is a little more difficult to determine the winners and losers. The principal reason being what determines what a good signal and bad signal is. Lighting, cameras, **VCR's** as well as the transmitter - make up the area of transmit, just to mention a few. If we deal totally with the esoteric method of determining the quality of the transmitter - then **AEA** has the lead again due to its vestigial sideband output. Reality tells me that John WR0J and Fred KY00 have the best looking signals on the band (in our local area). They are both running the **TC-70-1**. I also know that they have been tweaking on their units for the better part of three years to get them that way. A **TC-70-1** invariably has to be tweaked out of the box and do we all remember "PAPA SMURF"? It seems as though the **WYMAN** also needs a bit of work with the ole Graton tool. **The best looking signal, out-of-the-box, is the AEA.** Adjustment of the video gain pot on Neal's unit brought perfectly saturated color pictures in. Neal has since tried to obtain more power out of his

unit and in my opinion, reduced the video quality he once had. I also had a chance to compare the **PCE** unit and the **AEA** side-by-side at **HAMCOM** in Dallas last year and found the transmissions to be cleaner on the **AEA** unit.

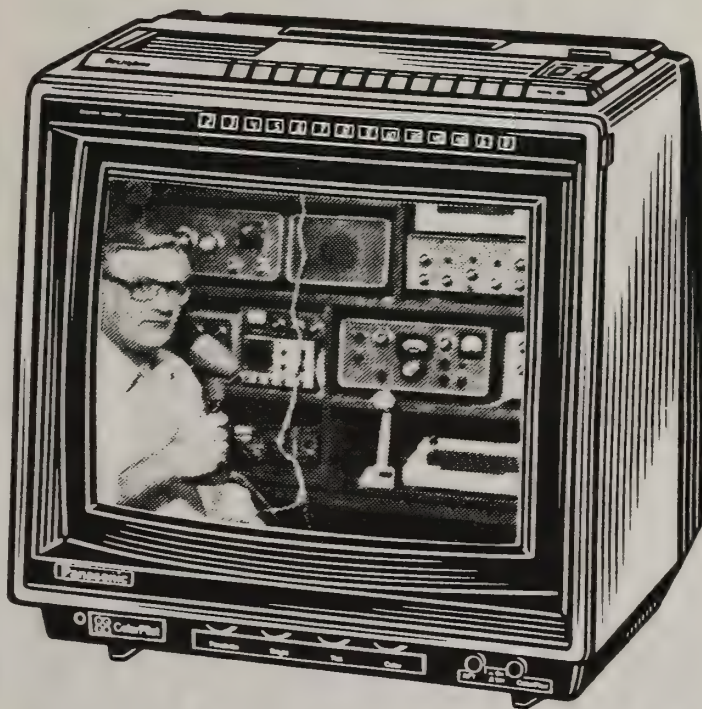
**Out-of-the-box, score another for AEA.**

What can be said about the **AUDIO** out of an **ATV** transceiver that hasn't been hashed, re-hashed and hashed some more? As a matter of fact, that is what most audio's sound like, a bunch of hash. To be truthful, I have to score this even between **AEA** and the **WYMAN**. The **WYMAN WR-450** doesn't have nearly as good of a 4.5 MHz. sub-carrier but does offer "AUDIO ON-CARRIER" where none of the others do. This gives you **MORE** audio punch but no one else can hear you (EDITOR: not in your area maybe Steve - its' used a lot in other areas where the troops do have receivers! Don't you guys have programmable scanners to listen for Dale's OC signal?-WB0QCD). As far as the **PC** goes, it ain't in the running.

Lastly is the **WORKMANSHIP** that goes into the units. The **PCE** looks like a typical American made (plastic) box, similar to Regency scanners of a few years ago. **The WYMAN is a vast improvement with components and boards of a much better quality. The AEA looks like it was made by KENWOOD or YAESU.** It is a beautiful work of art, my opinion of course. (Editor: You should "see" a T.D. System CU-125 **ATV** transceiver Steve! -WB0QCD).

**All in all, the AEA FSTV-430a is the BIG WINNER followed by the WYMAN and PCE is left somewhere in Pittsburg!**

73's de WV0J (National Anthem)



Clyde Miller WB4AOH at Owensboro, Kentucky

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## RESULTS OF AUGUST 1990 SPEC-COM/USATVS NORTH AMERICAN FSTV-DX CONTEST!



P3 200 Mile FSTV DX Signal of  
Don Miller, Waldron, Indiana

RESULTS OF THE 9TH ANNUAL NORTH AMERICAN FSTV DX CONTEST!  
report by Mike Stone WB0QCD

It's hard to beleive that nine years has past since The USATVS and SPEC-COM created and began implementation of ATV's only nationally sponsored Fast Scan TV contest. There have been some exciting years and some that were admittedly not so exciting. Despite good or poor participation, each year - we here at SPEC-COM, continue to offer the annual event for those who wish to participate in it.

It has been no easy task trying to establish the ground rules for such an event when there was no precedent. We have altered procedures from year to year to be more fair among competition and next year will be no exception. We continue to grow and learn with each passing event. We appreciate all your added suggestions and comments included with your log sheets every year. Each year, "our" event just gets more exciting and more FUN to operate!

Those of you who have been with us for nearly a decade or more will remember that for a few years - we held two FSTV contests (plus a national SSTV event). One FSTV DX orientated contest was held usually in the late summer/early fall of each year (designed in an attempt to "catch" seasonal band openings) and another, more QSO PARTY orientated in the spring (to get everyone out of the winter blahs). We dropped the spring event several years ago - because of lack of interest. Most subscriber/members voiced interest in keeping the fall event each year. There have been a number of requests this year to bring back the "spring" event contest which I will address later in this article.

We had a great, unexpected, E-X-P-L-O-S-I-O-N this year in activity levels! This years "stations participating" and actual entered log sheets have topped all previous entry and scoring records! We received official logsheets from 43 participants and it appears that the actual number of contesting ATVers (that contributed points) ran around 200! We couldn't believe the amount of mail that arrived just prior to the September 1st postmarked deadline. We suspected some pretty high-levels of interest were going to occur in this years event just before and during contest week as we received a number of phone calls from many areas asking for clarification of times, rules and guidelines just prior to and during the AUGUST 20 to 27th week of the contest.

#### OUR APOLOGY...

First, an apology. I guess I can blame it on being "overworked" (who wants to admit to total stupidity?) as we published WRONG contest operating dates in our JULY/AUG 1990 issue. The dates on our page 38 Rules & Guidelines article showed the 9TH ANNUAL NORTH AMERICAN FAST SCAN TV CONTEST to begin at 0001 on Monday August 19th until Sunday night August 25th. A few of you caught our dual-goof and as mentioned, called for clarification. Corrected dates were: from 0001 (local time) Monday morning August 20th to 2400 Sunday night August 26th. No logs entered showed early or late start/finish times - so apparently everyone got the word or understood as in previous years, that it was a Monday through Sunday 7 day event. Next year, we promise to include UTC start/end times. Some of you, got the correct dates from the rules that were posted on our EC Ham Radio BBS in Dubuque.

While we have had some well-meaning contest criticsizers over the years, who have said that contest logging procedures were just too complicated, we remain steadfast that our present procedures are indeed the most fairest, and the most FUN way to operate a TV VIDEO type special event. We helped the admittedly confusing scoring situation by publishing SAMPLE CONTEST LOGSHEETS with the initial announcement in The USATVS Journal rules & guidelines article. Those who have complained - have mainly been the ones who have entered the contest "from simply hearing about it" from other operators (non-subscriber/members) and who have attempted to enter these complicated scores without the use of any published logging aid. That indeed, would be difficult. Once explained, entrants admitted that it wasn't all that bad (this works out to be a real competitive advantage for USATVS Members & SPEC-COM Journal subscribers!).

#### SPLIT SCORING

We started out the contest during the first year by not having SPLIT RECEIVE and TRANSMIT SCORING. This caused a number of UNFAIR advantages and disadvantages to participants. Simply stated, it was possible to "sit back in your easy chair - on receive only - and beat everyone else who was two-way'ing it with both receive and transmit. A "sending station" would transmit his/her best signal - the lazy "receive only station" would grab the points and then say; "Sorry OM, I have nothing to send to you today - but thanks for all the points anyway..." (It happened more than once!). Thanks to spending a few hours with Don Hartman KAOBVT of Moscow, Iowa after the first initiated contest back in 1981 - Don and I mutually came up with the SPLIT SCORING idea which has worked well over the past 8 years. Of course, along with SPLIT SCORING comes the requirement to also SPLIT up the AUDIO and COLOR signal segments which adds to further complication. Throw in some DX MILES and BAND multipliers and a couple FM and MOBILE BONUSSES - and it is easy to get thoroughly CONFUSED! (We even had P-SIGNAL "multipliers" one year and we suspected nearly everyone CHEATED on that extra gimmie bonus). Naw, ATVers wouldn't fudge on P-Signal readings now would they?

#### FILLING OUT THE PROVIDED LOGSHEET FORM

The way we have the contest designed today is really working pretty well without much trouble. The published log sheet is a great help in keeping track of scoring. We will streamline the form on LASER for next years event. Yes, the (#) date and time columns could use a bit more room. CALL, LOCATION and MILES is, we feel, appropriately placed. We kept the MILES (MI) category away from the actual scoring area so as to not confuse more numbers with others. The P-SIGNAL reporting column is of no useful value to the contest (since nothing is actually based upon it any longer) but it is hard to imagine running a FSTV contest without a place to list such video image received information. Such a listing does help in going back to look at past contacts for improvement updates. Many still seem confused about RBASE and TBASE. RBASE is simply the RECEIVE BASE (initial contact) score. TBASE is the TRANSMIT BASE (initial contact) score. This year, they were BOTH worth 500 points EACH (not 1,000 each as some tried to claim but were corrected). The "MY VIEWED SIGNAL" reporting area above RBASE computations meant just that; "what kind of signal did I see at my QTH?" The "MY SENT SIGNAL" reporting area meant; "how was my signal viewed on the other end?". What's the difficulty here?

The FM boxed category was the place to list 1000 extra BONUS points for either FM or MOBILE operation. While BONUS points are awarded to reward special efforts of uncommon modes or operations - some unfairness still exists in this area that needs correcting. If an ATVer has went to the time, expense and trouble to build up an FM or MOBILE station - only THEY should get credit for it! After all, if someone goes FM or MOBILE and drives around town or the country - the "at home" fixed station operator does get extra points for just being able to work the station in that special mode. The FM or MOBILE operator should be able to reap the rewards of their own valliant efforts. The way it was understood by many this year, one MOBILE driving around working 10 "at home" extra stations - all ten got to claim



that they worked a MOBILE for 1,000 additional points (actually in competition and against the MOBILE station) and yet THE MOBILE (by exact definition) could claim only basic initial contact (as he/she did not work a mobile station), audio and color points. Being that this was clearly NOT the intent of the sponsors to limit and penalize such FM and MOBILE operations - all submitted logs were gone over for listed MOBILE contacts. 1,000 BONUS points were allowed (or added) for "at home" stations PLUS 1,000 points per contact were also GRANTED to the MOBILE contacts themselves. Next year, we propose that ONLY the MOBILE stations themselves receive a declared BONUS and no others with a 1 mile distance requirement to eliminate "the driveway closed-circuit bandits" (we would like your comments on this pro or con). Isn't this nutty, but FUN?

AUDIO BONUS points (250) have always been awarded for 2 Meter, standard 4.5 MHz. subcarrier, Independent Carrier or On-Carrier audio sound signals. There has been some discussion over the years to do away with the allowance of 2 Meter FM or SSB audio so to keep the emphasis on getting sound with the TV picture. I personally have mixed feelings about this but remain OPEN minded to this idea. What do you think?

COLORBURST BONUS points (250) have always been awarded in an attempt to get all operators to use COLOR in their transmissions both for the received TV set image as well as the sent use of Color Cameras. This can be done also by computer graphic images or VCR tapes.

Four SUBTOTAL boxes are provided on our logsheet for the ease of the operator to keep better score as he/she completes the LOGSHEET from left to right across the page.

BAND MULTIPLIERS (X2 for 33 CM., X3 for 23 CM. etc.) are awarded to give extra credit to those using "harder to operate" higher UHF to MICROWAVE band segments. It also encourages "additional" contacts on other than 70 CM. bands. In this years event, we had more 33 and 23 CM. contacts than ever before (17).

The valued BAND and DX DISTANCE MULTIPLIERS remain the real exciting point scoring booster for most long distance contacts! It is possible to live in a remote area, with little if any ATVers around you, thereby working far fewer contacts than others in metropolitan areas (with B/W non-audio signals) and yet still get HIGH SCORES by completing a few long-distance DX contacts if the band cooperates (right KFOFQ?). That is what THIS particular CONTEST is all about! DX DISTANCE MULTIPLIERS begin at 25 miles (X2) and progress upward at 25 mile increments (which all seem to agree is about right). A few have commented that they would like to see a X2 multiplier begin a bit closer, maybe at 10 miles or 15. COME ON YOU LAZY BUMS - IF YOU CAN'T GET YOUR SIGNAL OUT OF TOWN TO 25 MILES - YOU REALLY HAVEN'T MADE MUCH OF AN EFFORT AT YOUR STUDIO TRANSMITTER! UPGRADE YOUR SYSTEM WITH A BETTER ANTENNA, COAXIAL CABLE OR A POWER AMPLIFIER. You will have to come up to our minimum standards - we are not dropping ours. It just isn't that difficult to accomplish. Those living in larger metropolitan, highly populated areas, not so well equipped for DX'ing - get the advantage of making larger numbers of contacts with audio and color while those farther out (or who have built up their stations for long-distance operations) reap the rewards of DX DISTANCE multipliers. We feel its a fair tradeoff for most circumstances.

A REPEATER PENALTY of 50% deduction of total RBASE and TBASE scores is a compromise reached 3 years ago. We started out the first few years by NOT allowing REPEATER contacts at all. Realizing that this limitation penalized many, who for one reason or another, did not have DX'ing capability and yet who wanted to work the annual contest anyway - we changed our rules to allow for "relayed signal operation" but at a 50% score reduction penalty. This has been quite acceptable by all with NO filed complaints by anyone to date. Real "true-blue simplex DX'ers" have jeered this added requirement (and yet have been known to gather a few extra points by working some stations through a repeater system that would not otherwise be workable direct).

\*\*\* This year, as in the past, many have forgotten to LOG their local REMOTE TRANSMITTER station i.e. WEATHER RADAR or multi-channel video source feed for "extra" points. It is a bonefide Amateur TV station, is it not? (good for a one-way RBASE contact). If an RT SYSOP is smart - a quick run to the transmitter for a few hours - going into RECEIVE condition - can give lots of extra points to local users -

all quite legal here with the rules committee (an old Iowa trick now out of the bag). We heard NO ONE using 3.871 MHz. or any other HF DX coordinating frequency during the event. There was no advance publicity in the ATV Column by Bill Brown 73 Magazine. Lets see if he publishes the results?

A few have suggested that we CLOSE this contest only to SPEC-COM subscribers and USATVS Members. We have given that idea consideration but have always been OPPOSED to that idea in that shutting out interested operators negates the basic principle behind the contest itself i.e. "TO HAVE FUN AND TO GET MORE ATV ACTIVITY ON-THE-AIR". One of the purposes that any magazine sponsors such contests is to get call signs and names of new users or potential subscribers. It is an all-around healthy event for the entire industry.

We will considerate your suggestions as we do all the ideas sent in to us. We would like to hear from others of you with your suggestions on this topic.

Should this be a closed contest? What other ideas do you have for us?

#### FALL 1990 EVENT RESULTS & COMMENTS

The PUBLIC CHALLENGES, presented in our JUL/AUG issue, looks to have been taken to heart and not to heart by some ATV Clubs or Groups. Baltimore, Maryland BRATS members have out scored their directly challenged Mid-West as little activity was seen this year from that goupe. Maybe next year that will change. We saw many new groups working the contest this year and hope more new and old next year.

KA0JAW in Dubuque, Iowa missed the contest this year as he had moved and has been kept busy with business and travel so was unable to finish his tower work. We understand Mike is planning several improvements to his ATV system this year that will put him in the contest next year. Keep your eyes open this winter for his new station that will include a pair of FO-22 beams, new pre amps, bigger RF amp, on carrier audio and much more.

They have a lot of active people on FSTV over east of us - but I guess few that are horizontally polarized, with power and the will or time to work a national contest. Come on fellas - join in on the fun next time!

The small but mighty MATS Group from Maquoketa, Iowa (all 7 of them, HI), must now "bow" for a year, to The WESTERN VISION NETWORK ATV Group based out of Denver, Colorado. Nine logs were received from Colorado and only two from Iowa. It was, simply put - NO CONTEST. The Colorado group really came alive in 1990 and are even planning a DX'pedition up to Mt. Evans soon. Way to go BRONCOS!

The KANSAS CITY ATV CLUB led all others in a new all-time record "combined club" score of 548,625 points! Twelve logs were sent in to The USATVS from KC including: WAONKE WROJ NEOA WOJZR KGOR NODYM WBOJTX NOJRB WJOR WAOWPJ WDOEZA KDOFW and KFOFQ. The new KC ATV Group showed true "club spirit" by making photocopies of our published contest log for all who were interested in entering by inserting them into one of their "TAKE ONE" Newsletters. According to after the contest phone calls from Dale Lam WAONKE, John Gratton WROJ and Mike Bogard KDOFW, they all "worked together" helping each other with the maximum allowable points for a higher combined CLUB score. Several ran around the KC area "mobile" as well. Everyone's participation in this years event was the "hot" topic of discussion at the next club meeting. We have heard that the "horizontally polarized" KC WROJ repeater system was "seen" up in the Minneapolis/St. Paul, Minnesota area the day after the contest ended (of course). That's a ways down the road (about 600 miles). It's ashame the FUN and activity that Des Moines and Omaha DX'ers are missing (staying vertical). Congratulations all who entered!

The WESTERN VISION NETWORK Club in Colorado took 2nd PLACE CLUB SCORE HONORS with 330,250 points! We received logs from 9 members: WBOTUB WDOAQX NOIVN KORZ NOKKZ NOH2Y W6ORE WB5RMG NW0J. No logs or entries were received from the Omaha, Nebraska G.O.A.T.S. ATV Group nor their challenged PALMETTO, South Carolina ATV Club. We thought for sure we would get logs from Ohio, St. Louis and Texas fellas, but no luck this year. Don Miller W9NTP's hefty Indiana signal however, was seen in the Illinois, Iowa and Missouri area as were several Ohio & Michigan stations. It has been agreed that MORE emphasis will be placed on CLUB participation for future events as this seems to be where the FUN and SPIRIT is!

#### CONTEST EVENT INDIVIDUAL ACCOMPLISHMENTS!

KLM Antennas get 1-2 punch on 70 CM.

O.C. "Bud" Leas KFOFQ from Climax Springs, Missouri had to be the "surprise" newcomer of all times - working the contest but for only the last two days that he knew about it



- with a total score of 22 contacts and a record 159,000 points to take FIRST PLACE HONORS in the NATION! Bud lives on a high hilltop location in the Lake of the Ozarks area some 100 miles from any other ATVer. Bud "monitored" the recommended 144.340 MHz. DX operating frequency and started hearing quite a few St. Louis, Iowa, Minnesota and Kansas Fast Scanners on 2 Meters on the morning and evening of the August 26th. He worked a number of them including 18 over 100 mile contacts into the Kansas City, KS. and MO. area, one to St. Louis (KDOLQ), one to Arkansas (NOALJ) and even one into Iowa (WBOQCD)! Bud was seen here in SE Iowa at P2 level (without a preamp!) and full quieting on 2 meter FM, a distance of over 300 miles! Bud attributes much of his long-distance DX success to his high location, "good ears" on .34 and a trusty new 18.2 DBd gain KLM 40CX OSCAR yagis antenna (with the circular switch removed for the contest). He runs a PCE TC-70 with only about 35 watts of power (Mirage D26). Of course, as usually happens, the band really OPENED on Monday, the day after the contest and KFOFQ worked two stations up in the Minnesota area (WAOWBE was one of them) - a measured distance of about 500 miles! These contacts, although they cannot be counted as part of the contest - will be entered for verification into the USATVS TOP 50 ALL-TIME UHF ATV-DX SCORE LIST. Congratulations KFOFQ!

Mike Bogard KDOFW went "multi-band mobile" to get his high score placement! His mobile was equipped with 70, 33, 23 and 13 CM. gear. He was the only KC ATVer that counted their RADAR on 426.25 and 439.25 as a legal signal source. His 31 contacts gave him a total of 125,500 points - good enough for 2nd place! Edited comments from KDOFW: "We had one hell of a good time in the NA USATVS FSTV contest! It really brought out the gang and a few that had not been on the air for some time."

Ron Hranac NO1VN and William Burris WDOAXQ "burned up" the Colorado ATV airwaves on 3 bands! Ron totalled 91,500 points and 18 contacts in just 2.5 hours that he had time for working the contest for a great 3rd place finish nationally. William wasn't far behind at 66,000 points from Golden, Colorado (5th place). Ron drove up into Mt. Evans at 14,264 feet AMSL to give out some long distance contacts both on AM and FM on 23 CM. He worked N0HZY N0KKZ W6ORE K0RZ N0JBK N0KKZ N0WJ WDOAXQ and W0GVT from high in the Rockies!

Dale Lam WAONKE also had to have two log sheets to fill out his 30 contacts in the Kansas City area. Dale took 4TH PLACE NATIONAL HONORS with a very respectable combined total score of 81,125 points working both 70 and 33 CM. Dale also helped fill out some logsheet entries for other area ATVers not so familiar with the contest to get a better overall Kansas City Club Score total. His longest contact was with KFOFQ at 106 miles. WAONKE uses a WYMAN WR-450 rig on base. William Burris WDOAXQ mentioned earlier, got his 6th place high score "the hard way" - HE EARNED IT! All 10 of his full color and sound, two-way contacts had a X3 BAND multiplier (23 CM) taking a 2,000 maximum score for most to 6,000 points each! His contact with NO1VN up in Mt. Evans (36.5 miles) on 23 CM. also gave him a X2 DX DISTANCE multiplier. THANKS FOR THE LOTUS RE-DONE LOG ENTRY SHEET BILL! We'll have a better logsheet for everyone one next year! (Can you get that over to Ron NO1VN for a LASER printout?).

Robert Doolittle WA1WVJ of West Haven, CT. "did a lot" in point scoring for only 9 contacts (quite a few for Connecticut) totalling (a revised) 25,750. His best DX was 56 miles. Thanks for the entry again Bob.

The always faithful contest entrant, Casimer Pustelnik W2OSW of Buffalo, New York scored (revised) 18,500 points this year. His log for some reason was based on last years point accumulations which were a lot less. We corrected his log to reflect the proper 1990 scoring table. Casey commented along with his log that he would like to see some of the spaces within the logsheet expanded (more room for writing) and; "We had no band openings in this area. I did work some NEW ones and had a good time as usual..."



1st Place National Winner Bud Leas KFOFQ  
- 159,000 points  
WHY WAIT?

You are all absolutely right! WHO WANTS TO WAIT ANOTHER YEAR FOR ANOTHER EXCITING AND FUN CONTEST? Let's RENEW the SPRING "NORTH AMERICAN ATV QSO PARTY CONTEST!" We shall emphasize individual and CLUB-cooperative SCORING. The dates? How does the 3rd week in March sound? By then, we will need some self-induced excitement to get rid of the winter blahs and we can present "all" of the awards at our April DAYTON ATV Workshop sessions! Thanks to all who participated in making this years fall ATV DX contest our best success ever! 73's -WBOQCD

#### 1990 NA FSTV CONTEST "TOP 25" FINAL OFFICIAL LOGSHEET SCORES!

#	CALL	NAME	LOCATION	SCORE	#CON	BESTDX	HRS
1	KFOFQ	Bud Leas	Climax Springs, MO	159,000	22	300	6
2	KDOFW	Mike Bogard	Independence, MO	125,500	31	88	20
3	NO1VN	Ron Hranac	Littleton, CO	91,500	18	38	3
4	WAONKE	Dale Lam	Kansas City, KS	81,125	30	106	25
5	W9NTP	Don Miller	Waldron, IN	67,750	18	180	5
6	WDOAXQ	William Burris	Golden, CO	66,000	10	37	2
7	WROJ	John Gratton	Kansas City, KS	56,625	25	25	NA
8	NEOA	Douglas Roberts	Kansas City, KS	43,250	18	120	4
9	W9DNT	Merle Reynolds	Moline, IL	43,000	15	150	10
10	W0JZR	Ted Eagle	Shawnee Msn, KS	35,875	17	25	7
11	KGOR	Gary Liebling	Kansas City, KS	34,000	13	108	4
12	K0RZ	William McCaa	Boulder, CO	32,000	10	38	2
13	N0DYM	Kevin Connell	Leavenworth, KS	31,750	8	130	5
14	N0KKZ	Rich von Glahn	Aurora, CO	31,500	8	35	2
15	WBOJTX	Larry Parker	Gladstone, MO	31,000	10	110	9
16	N0HZY	Dave Melton	Denver, CO	31,000	11	26	2
17	WA1WVJ	Bob Doolittle	West Haven, CT	*25,750	9	56	20
18	WBOJUB	Tim Armagost	Littleton, CO	25,500	10	28	NA
19	W6ORE	Bob Schellhorn	Westminster, CO	*19,250	4	38	5
20	W2OSW	C. Pustelnik	Buffalo, NY	*18,500	7	30	3
21	WB5RMG	Alan Sieg	Littleton, CO	17,500	6	29	2
22	W0JRB	Bob James	Kansas City, MO	16,250	14	3	10
23	NW0J	Rich McElravy	Aurora, CO	*16,000	3	36	1
24	WJ0R	James Jones	Excelsor Spr, MO	13,000	11	25	3
25	WAOWPJ	Craig Martin	Kansas City, MO	10,250	9	25	10

#### ENTERED "TOP 10" JOINT-COMBINED CLUB SCORES

1.	Kansas City (KS/MO) ATV Club	548,625 (12)
2.	Colorado Western Vision Network	211,764 (9)
3.	Indiana ATV Club	67,750 (1)
4.	M.A.T.S. ATV Group (Iowa)	64,675 (2)
5.	Quad-City (BRATS) ATV Club	43,000 (1)
6.	West Haven, CT. ATV Group	25,750 (1)
7.	Buffalo, New York ATV Group	18,250 (1)
8.	B.A.T.S. (Baltimore, MD.)	7,600 (1)
9.	3M Minnesota ATV Club	5,220 (1)
10.	Southern California ATV Club	3,850 (1)

\* designates corrected log



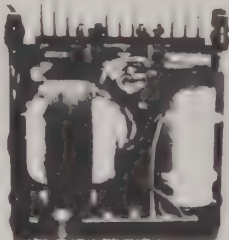


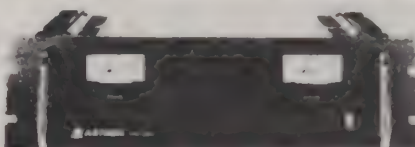



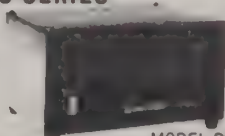
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\*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)



[PHOTOCOPY THIS PAGE!]

**FCC Docket 89-554 Threatens FSTV 421.250 MHz. Operations!**

Comment Deadline Date Draws Near! The USATVS Has Acted. Have You?

We (SPEC-COM Communications & Publishing Group, Ltd. and The USATVS) have just received word (WSYI REPORTS, October 15th, 1990, Volume 12, Issue #20 and WESTLINK REPORT Number 587, October 26th, 1990) - that the FCC has made its intentions known about proposing the placement of L.E.O. (Low Earth Orbiting) Satellites "downlinks" on the 420-421 MHz. portion of our 70 cm. band. Uplinking is proposed for 148.0 to 149.9 Mhz. on the 2 Meter band. This proposal will be made to the International Telecommunication Union World Administrative Conference to be held in Spain in February/March 1992. Our immediate concern, is for already established and future Fast Scan TV Repeater, Simplex and Crossband operations on 421.250 Mhz.. The FCC has stated that "existing users can be accommodated with the 421-430 MHz. band". As you all know, our FSTV wideband emission signals even with vestigial sideband filtering requires a clear spectrum above and below the center video carrier to ensure non-interference. Most of the TV signals power density is contained within the first megahertz of radiation. The removal of 420-421 Mhz. as an Amateur Radio UHF band "might" cause interference to satellite users and they to us. The type of signal to be used on L.E.O. Satellites is of Packet Radio data transmissions in nature. Perhaps the two services would be compatible without problems? Both modes need time for testing in that area. We feel, however, that the additional loss of even 1 MHz. of an already very crowded 70 cm. band is something which we must fight against.

SPEC-COM Communications & Publishing Group, Ltd. and The USATVS are both doing something about this dangerous situation. We have already filed our comments to the FCC in Washington of our concern against (NOI) Docket 89-554. We have sent each residing Commissioner a letter. We have also sent an urgent letter to David Sumner K1ZZ at The American Radio Relay League in Newington, CT. We scrambled at the last minute to get word of this in our year-end, NOV/DEC 1990 issue which was just about to go to press. We are inserting the included "clip and mail" response form in this issue for "all" USATVS members to fill out and send to the FCC, ARRL and the USATVS. This is perhaps the single most important THREAT to Amateur TV operations in several years. We are mailing pre-issue copies of this letter and form to "key" targeted areas and groups across the country. Please make copies of these pages and distribute them quickly to members or active ATV operations within your group. The deadline given by the FCC for comments on (NOI) Docket 89-554 has been given as December 3rd. WE DO NOT HAVE MUCH TIME! Act and respond NOW! Do nothing - and help to lose part of our precious 70 cm. band.

**"TAKE ACTION NOW TO LOBBY AGAINST FCC DOCKET 89-554!"**

Mail 6 copies to the FCC, 1 to the ARRL and the USATVS. **DEADLINE FOR COMMENTS to the FCC is December 3rd, 1990!** If an ATV Repeater which has an output on 421.250 MHz. is operating within or nearby YOUR area - attach an additional letter from you AND YOUR CLUB about this system's concern as well!. Tell the Commission how long YOUR system has been in operation, how many "active" users it has, and what "good" the ATV mode has done for PUBLIC SERVICES. We also urge you or your ATV group to send a **DONATION** directly to The ARRL's "WARC WAR CHEST" fund. The League hopefully, will be our strongest supporter in this dangerous issue. "Remember" which National ATV ORGANIZATION & MAGAZINE "acted" on behalf of the ATV mode concerning this battle. Discuss this serious issue "on-the-air" with other active ATVs quickly and try to get them react as well! WE NEED YOUR HELP AS WELL! How? If you are NOT now a SUBSCRIBER to The SPEC-COM Journal/Member of the USATVS - you can JOIN and support our efforts by SIGNING UP (\$20 a year - 6 issues). Thanks for participating. -KA0JAW & WB0QCD, the Staff at SPEC-COM and The USATVS.

Federal Communications Commission, 1919 M Street, NW., Washington, D.C. 20554  
The American Radio Relay League, 221 Main, Newington, CT. 06111  
The United States ATV Society, P.O. Box 1002, Dubuque, IA 52004

This page space (scheduled HAWKEYE AD) donated by "CLOSED CIRCUIT VIDEO" in lieu of the importance of this issue.

----- clip & mail ----- clip & mail -----

To: F.C.C. - 1919 M Street, NW., Washington, D.C. 20554

From: \_\_\_\_\_ Amateur Radio Callsign \_\_\_\_\_  
Address \_\_\_\_\_ City/State/Zip \_\_\_\_\_

Reference: (NOI) Docket 89-554; WARC '92 Proposal - L.E.O. Satellites

Dear Commissioner:

With this mailed notice, I urge the Commission NOT to adopt a W.A.R.C. proposal (Docket 89-554) which would THREATEN the operations of Amateur "Fast Scan TV Repeater, "Simplex" and "Crossband TV Signal Relay" emissions now in operation near the 420-421 MHz. UHF band. Wideband TV signals (even VSB filtered) need proper spectrum operating area to ensure non-interference. I am a member of THE UNITED STATES ATV SOCIETY and have voiced my concern for that organizations' lobby against this proposal as well. Such a presented proposal as written, would be disastrous to ATV operations on our already crowded 70 cm. band! Please give this proposal some more thought. Thank you.



# SPEC-COM reviews Engineering Consulting's VIDG character generator cartridge for Commodore computers

By Ron Hranac, N0IVN

I was thumbing through the "Classifieds/Business Directory" section of a recent issue of *Communications Technology* magazine (a cable TV technical publication), and ran across an ad that had a familiar look. The company, Engineering Consulting, runs similar ads for Commodore 64 products in several ham radio publications. But what really caught my eye in the *CT* ad was a video character generator cartridge for C-64 computers — and it was less than \$200.00! So I obtained a model VIDG video page generator EPROM cartridge, and ran it through its paces for SPEC-COM.

## The product

Engineering Consulting's VIDG video page generator is a software cartridge for Commodore 64 computers. It is shipped with an instruction sheet and an eight-inch DIN to BNC video jumper cable. The cartridge itself is a standard C-64 style EPROM cartridge, measuring 2-5/8 inches x 3-1/2 inches x 25/32 inch (about the size of a pack of cigarettes).

The cartridge turns a Commodore C-64, SX-64, or C-128 computer into a low cost video character generator. The supplied jumper cable provides an interface to the computer's DIN video jack, allowing easy connection to a video monitor or ATV transmitter auxiliary video input. The character generator functions include the ability to display text messages in three different letter sizes on up to 24 lines. Flashing and crawling (the manufacturer calls it scrolling) are available, and the lines can be any of 16 different colors. The latest software version supports up to 300 text pages in 30 folders, and as many as 99 folders of ten pages each can be stored on disk. A clock can be displayed in the lower left corner of each page.

When first turned on, a Commodore equipped with the VIDG plug-in cartridge will display a default sample cable TV "syndex" message. If pages of text have been stored on disk, and the disk is in the drive when the computer is turned on, then the default display will be what was stored in folder #0 on the disk. Alternatively, the manufacturer can permanently store one user-created folder of ten pages in an eeprom cartridge for an additional cost.

The Commodore's function keys (F1-F7) control most of the character generator's menu items. F1 is used to bring up the edit screen, where pages of text are created. F2 saves pages to an initialized disk, F3 loads previously saved pages from the Commodore's disk drive, and F4 is a utility function that will initialize blank disks. F5 brings up the "play multiple pages" screen, which is used to define what pages will be displayed. F6 is to set and turn on the clock; if this function is activated, then all pages will have the clock displayed in their lower left corner. F7 turns a screen blanking feature on and off.

Additional command keys are used when the edit screen is active. The back arrow (<-->) will cause a line to crawl, but the software limits this to a maximum of two lines in the smallest letter size (up to 240 characters per crawl). When the edit screen is not active, the back arrow also can be used to enter the page editor.

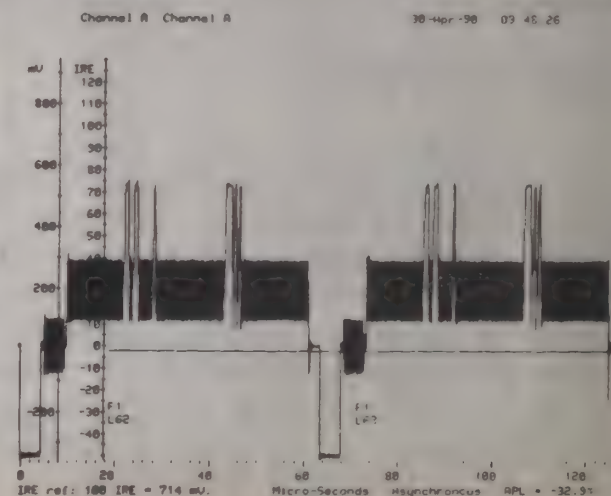
The up arrow (^) followed by number 1, 2 or 3 flashes a single line of text at the size indicated by the number. An asterisk (\*) followed by number 1, 2 or 3 can be used to set text size on a line. For either command, 1 is the smallest text size with 40 characters per line at single line height, 2 is a medium size with 40 characters per line at double line height, and 3 is the largest with 20 characters per line at triple line height.



The @ symbol sets the line position on the display screen. For example, @12 would place the text on display line 12, @01 on line 1 and so on. A pound symbol (£) followed by a two-character command defines line color. The first character of that command sets text color, and the second character sets background color. The 16 available colors and their respective command characters are: black (0), white (1), red (2), cyan (3), purple (4), green (5), blue (6), yellow (7), orange (8), brown (9), light red (a), dark grey (b), medium grey (c), light green (d), light blue (e), and light grey (f).

The documentation provided with the cartridge is a one-page instruction sheet. I found that a little trial and error was necessary to learn the capabilities of the software, since the instruction sheet is little more than an overview of the character generator's operation. The VIDG is by no means a Chyron-quality character generator, but for the cost it provides a number of basic features that make it especially useful to ATV operators who want good text capability without having to spend several thousand dollars. At the time of the evaluation, the VIDG's cost was \$189.00, and a modem option to allow remote programming and operation is available.

## 2H display





### Lab measurements

The cartridge itself contains the software that operates the Commodore, and as such, the measured video quality is what the computer produces, not the VIDG. Because there are no video test signals generated by a Commodore, distortions such as differential gain and phase, chrominance-to-luminance gain and delay, frequency response, etc. could not be measured.

A Tektronix VM-700 automatic video measurement system was used to characterize a few basic video parameters, and while not broadcast quality, a Commodore's output video is actually pretty decent. The accompanying table summarizes what was measured; unfortunately, the computer has no internal adjustments to vary any of these parameters.

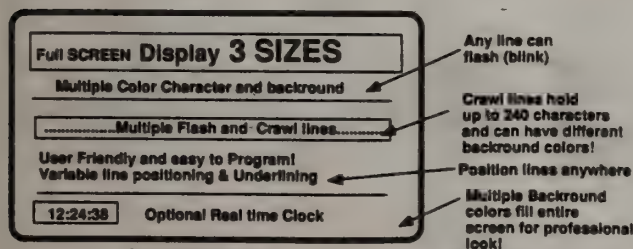
### VM-700 measurements

Parameter	Measured
Peak-to-peak video amplitude	125 IRE (0.89 V)
Sync amplitude	49.7 IRE
Sync risetime	96 ns
Sync falltime	88 ns
Sync width	4.46 $\mu$ s
H line frequency error	within 0.02% of reference
Burst amplitude	25.2 IRE
Cycles of burst	15.3
Burst frequency	within 0.1 Hz of reference
Equalizer width	2.29 $\mu$ s
Serration width	2.33 $\mu$ s
VBI width (field 1)	20.0 lines
VBI width (field 2)	20.5 lines

The subjective quality of the displayed text is good. Some newer digital TVs may have problems with the Commodore video (jitter in the picture), but this has nothing to do with the VIDG cartridge. I transmitted the text through Denver's crossband ATV repeater, and received video quality was rated high by all who saw it. My only real complaint is about a glitch that occurs when the character generator changes from one displayed page to the next. (In addition to the modem option recently introduced by Engineering Consulting, the software in new versions of the cartridge is 100% machine code, which increases the speed of screen updates and should eliminate the glitch between pages. The cartridge I tested contained an earlier version of the software, which is a combination of machine code and Commodore Basic language.)

Keeping in mind that the VIDG is a low cost character generator, you won't find advanced editing features like home, line copy, justification, centering, or random page access, although the user can sequence the pages and/or folders in any order. Display features like roll, pop-up, edges and frames (for characters, words, or pages) also aren't available. But then, for a character generator that costs less than \$200.00 (not including the computer), those things shouldn't be expected.

For more information, contact Engineering Consulting, 583 Candlewood St., Brea, CA, 92621 (714-671-2009).



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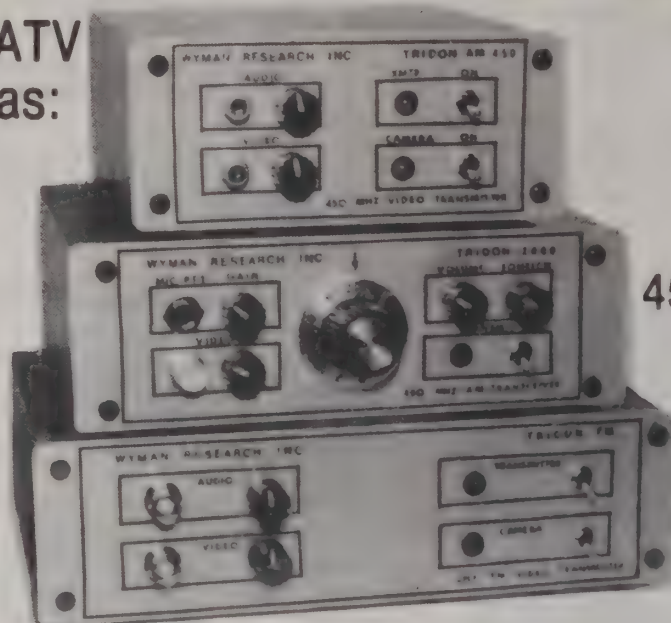
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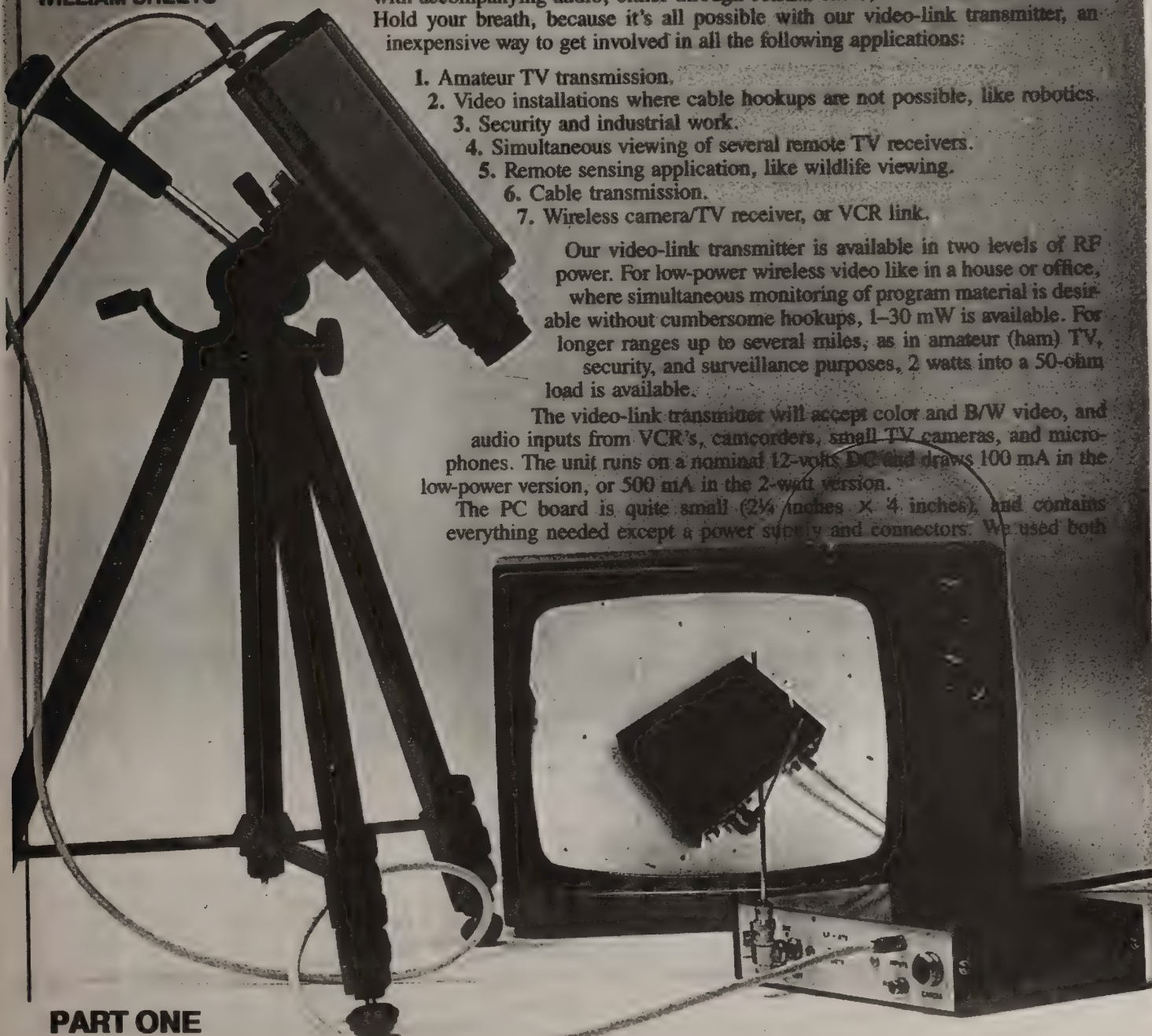
HOW WOULD YOU LIKE TO TRANSMIT COMPLETE VIDEO, EITHER COLOR OR BLACK-AND-WHITE, with accompanying audio, either through coaxial cable, or to a remote receiver? Hold your breath, because it's all possible with our video-link transmitter, an inexpensive way to get involved in all the following applications:

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Our video-link transmitter is available in two levels of RF power. For low-power wireless video like in a house or office, where simultaneous monitoring of program material is desirable without cumbersome hookups, 1-30 mW is available. For longer ranges up to several miles, as in amateur (ham) TV, security, and surveillance purposes, 2 watts into a 50-ohm load is available.

The video-link transmitter will accept color and B/W video, and audio inputs from VCR's, camcorders, small TV cameras, and microphones. The unit runs on a nominal 12-volts DC and draws 100 mA in the low-power version, or 500 mA in the 2-watt version.

The PC board is quite small (2½ inches × 4 inches), and contains everything needed except a power supply and connectors. We used both



**PART ONE**



subminiature and surface-mount components because they perform well at RF, requiring simple tuneup without complex test equipment. In fact, a good tuneup can be achieved with only a VOM and a TV receiver.

Readers may be familiar with the author's previous article on an RF video-link (February, 1986, *Radio-Electronics*). Since then, many improvements have been made. The new transmitter is easier to tune, uses three slug-tuned coils instead of air-wound, and has a double-sided PC board for better shielding and grounding. Additionally, better transistors were substituted in the new design, which also has an integral power amplifier, and audio/video gain controls for easier interfacing. Linearity control was added to optimize video quality.

### Liability

**Be warned:** The 2-watt version is intended for educational purposes, legitimate TV broadcasting, amateur TV, and industrial, and scientific purposes. It can transmit several miles, so those intending to use our design must have a Technician-class amateur-radio license.

### Carrier frequency

As Fig. 1 shows, transistor Q1 and the surrounding circuitry is a crystal-controlled oscillator operating at  $\frac{1}{8}$  the video frequency, from 52.5 to 62.5 MHz. After being multiplied by

four through frequency-doublers Q2 and Q3, the output covers 420–500 MHz, overlapping the 430-MHz ham TV band and the lower UHF (300 MHz–3 GHz) TV channels.

First, the frequency is doubled to 105–125 MHz by Q2, and then to 210–240 MHz by Q3. With some modifications, higher or lower frequencies are possible, but with lower power above 500 MHz, and higher power below 420 MHz. Double-tuned interstage networks suppress unwanted harmonics. Then, Q4 doubles Q3's output to the final carrier frequency, which is injected into transistor Q5.

In the low-power version, Q5 modulates the carrier by  $V_{cc}$ . The RF (1–30 mW, depending on coupling) is taken from Q5's collector and fed to either a cable or a 6-inch whip antenna. In the high-power version, Q6 and Q7 form a high-gain RF power amplifier, and adjustable matching networks are used in the circuit for optimum tuneup.

Instead of matching networks, a tuned strip-line design was contemplated, but at 420–500 MHz, it would have occupied too much PC-board area. Broadband RF chokes, surface-mount (tantalum chip) capacitors, and careful design strategy avoided possible low-frequency spurious oscillations. We ended up with a very stable, efficient, reproducible circuit having no UHF "horrors."

### Modulator

The audio input at J1 will accept a wide range of voltage levels; 10 mV (typical microphone output) to 1 V (line input) is fed to audio-amplifier Q8. The audio-gain control adjusts for optimum modulation of Q9, a Colpitts Variable Control Oscillator (VCO) producing 4.5-MHz FM audio subcarrier, which is fed to video amplifier Q10, where it is then combined with the video from J3.

The video input at J3 may be 0.5– to 1.5-volts peak-to-peak, negative sync, while the video-gain control prevents Q10 and Q11 from video overload. Current-source Q10 and amplifier Q11 feed modulator Q12, which is capable of producing video having a 12-volt swing, and can drive a load up to 1 amp. Its bandwidth at –3 dB is in excess of 10 MHz, assuring crisp picture detail.

In the high-power version, Q12 is a power supply to Q6 and Q7, effectively amplitude modulating the RF carrier. In the low-power version, Q5 is modulated in the same manner. A linearity control adjusts Q12's operating point for optimum modulation linearity. The Q-point must be properly set; otherwise, video clipping will occur, producing "burned-out" picture highlights (white areas) and loss of detail. Other Q-point problems could include sync "buzz" in the audio, and loss of picture stability in extreme cases.

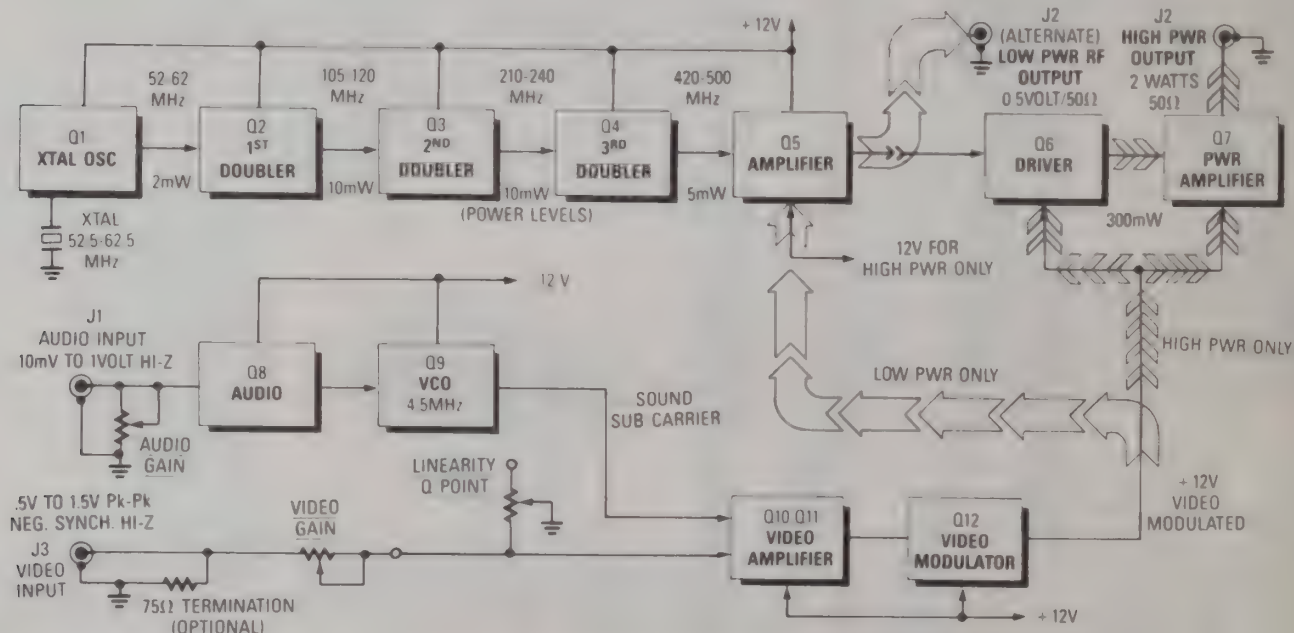
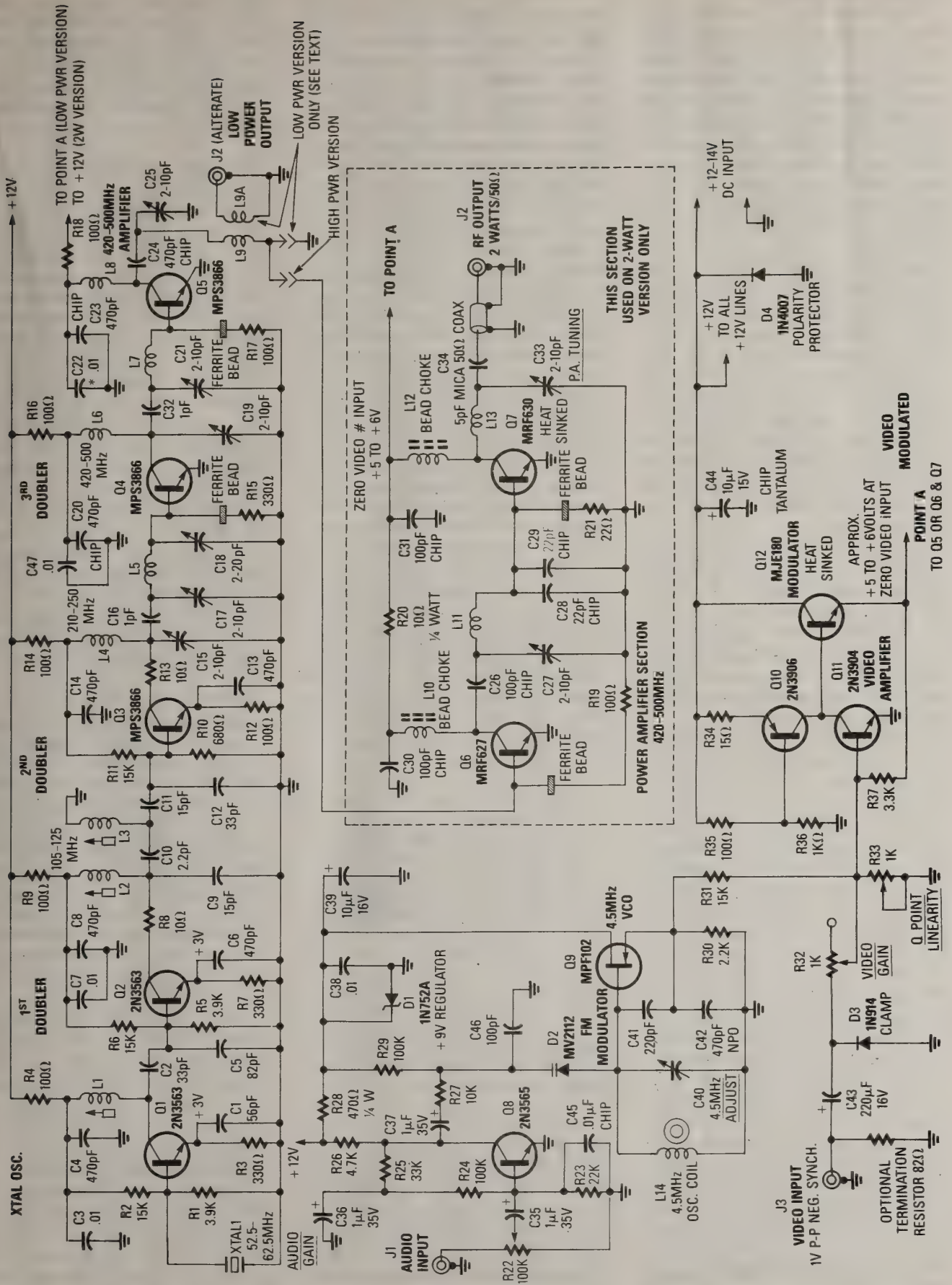


FIG. 1—VIDEO-LINK TRANSMITTER CAN BE CONFIGURED for either low-power, or high-power operation.





**FIG. 2—HIGH POWER, 2-WATT Video-link Transmitter.**



## Frequency doublers

Referring to Fig. 2, VHF transistor Q1 is biased at 10 volts and 5 mA, with the Q-point set by resistors R1, R2, and R3. Crystal XTAL1 is series-resonant, "bypassed" to ground. At the crystal's resonant frequency (between 52.5 and 62.5 MHz), Q1 is a common-base amplifier. Tank (tuned circuit) L1/C2, in series with C5, together with about 1–2 pF of stray capacitance, form a load for the collector of Q1.

Once Q1 starts oscillating, its collector current is typically 5–10 mA, and depends on the tuning of L1. Here, C3 and C4 bypass the "cold" end of L1 solidly to ground for AC. Internal collector-to-emitter (C-E) feedback occurs in Q1 via the intrinsic 2-pF C-E capacitance. Here, C1 forms a voltage divider to feed the collector back to the emitter. Note that C1 is not for emitter bypass, but is part of the feedback network of oscillator Q1.

A portion of the voltage across tank L1/C2, and C5, is fed to Q2 by the voltage division between C2 and C5. Next, Q2 and its associated circuitry is a frequency doubler, where a large drive signal from Q1 causes rectification in Q2's emitter-to-base (E-B) junction, which produces considerable harmonic generation.

At twice the oscillator frequency, C5 has low impedance; keeping the impedance low in Q2's E-B circuit by using a large value (82 pF) for C5 also helps produce efficient harmonic generation. Biasing for Q2 is the same as Q1, via R5, R6, and R7. Bypass C6 adds stabilization, as does C7 and C8.

Tank L2/C9 is tuned to twice the crystal frequency. R9 supplies DC to Q2. A slug in L2 tunes the tank, while C10 couples RF energy at 2 times the crystal frequency to a second tank L3/C11/C12, also tuned to twice the crystal frequency. Using dual tanks assures good selectivity, and improved rejection of unwanted frequencies; that's important for a clean transmitter signal. Next, R8 in Q2's collector suppresses any self-oscillation tendencies at unwanted, parasitic UHF.

Frequency doubler Q3 (MPS3866, 400-MHz, medium power, 1-W, plastic) is fed at 105–125 MHz from the junction of C11 and C12. Here, R10, R11, and R12 bias Q3. The RF level at Q3's base is quite high, and that affects Q3's biasing, while the collector current runs at 10–15 mA.

Note that Q3 offers better performance at 250 MHz than the 2N3563's used for Q1 and Q2; Q3 doubles the frequency to between 210 and 250 MHz. Except for frequency, Q3 operates similarly to Q2. Then, R13 suppresses UHF parasitics, and L4/C15 form a bandpass filter tuned to twice the input frequency. At 250 MHz, C1 (for Q1) and C3 (for Q2) are ineffective, whereas C14 is sufficient. Finally, R14 feeds DC to Q3.

Note in tank L4/C15 that C15 is variable and L4 is fixed. Slug tuning is no longer practical because L4 has too few turns. Energy is coupled through C16 to tank L5/C17/C18, which forms a double-tuned bandpass filter at 210–250 MHz. Then, C17 is for RF tuning, while C18 will optimize matching into Q4, the last (third) doubler.

Figure 3 shows how a ferrite bead is slipped over one lead of R15, which causes a high series-impedance at RF, yet passes DC without attenuation, thereby completing the base circuit DC path for Q4. The bias is now supplied entirely by the drive signal; no extra DC bias is applied. The emitter of frequency-doubler Q4 is directly grounded, because bypassing emitter circuits at 420–500 MHz is difficult without some loss of RF gain; however, a low value of R15 keeps DC stability adequate.

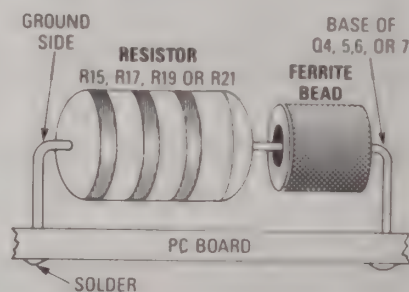


FIG. 3—SLIP RESISTOR LEAD through ferrite bead. The bead inductor causes a high series impedance at RF, yet passes DC without attenuation.

Tank L6/C19 (a short length of wire) operates at 420–500 MHz. Both C19 and C20 provide low-frequency video and RF bypassing, while C29 bypasses UHF; they also stop any stray low-frequency gain in Q4. Tantalum-chip C20 is the only type effective at 420 MHz, and provides a solid RF ground for the "cold" end of L6.

The 420–500-MHz at Q4's collector is fed to tank L7/C21, via C32,

which matches Q4's collector circuit to Q5's low base impedance; together with L6/C19 they form a double-tuned UHF circuit. The ferrite bead and R17 provide a low DC impedance, but a high RF impedance to the base of amplifier Q5.

## Low-power version

The UHF signal is amplified to about 30 mW by Q5. Choke L8 keeps RF energy out of the DC power supply. C22 and C23 bypass video and UHF, respectively. Note that if Q5 is video modulated (the low-power version) then C22 must be deleted, because it would cause loss of high-frequency video components; moreover, R18, which limits the supply current to Q5, must be returned to Q12's emitter. Tantalum-chip C24 couples RF output, yet blocks DC (and video, if applicable) from the tank circuit L9/C25.

In the 1–30-mW version, L9 couples the RF output to the secondary link of wire L9A, which then transfers the RF to output jack J2A (Alternate). Note that J2A and L9A are not used in the 2-watt version. Output power is limited depending on the proximity of the link L9A to L9.

## High-power version

In the 2-watt version, L9 matches to the base of driver Q6, and Q5 is fed straight, unmodulated +12-V DC. The full 30-mW drive from Q5 drives Q6. The ferrite bead and R19 provide a high RF impedance, and low DC resistance at Q6's base. Since a ferrite bead looks more like a high resistance rather than a reactance at high frequencies, the effective Q is very low. That prevents the possibility of parasitic oscillations that could occur if a conventional-type solenoid-wound RF choke were used.

Here, C27, L11, and tantalum-chips C28 and C29 match Q6's collector impedance to Q7. RF-choke L10 is made with three turns of wire wound through a ferrite bead, in a toroidal fashion. That results in a low Q, about 1000 ohms resistance, and again avoids possible parasitics.

Tantalum-chip C26 is used to minimize stray inductance, and couples RF energy from Q6 to Q7. Now, C30 and C31 bypass UHF to ground while looking like a high impedance at 20 MHz or lower, so the video component of the modulating power supply voltage is relatively unaffected. Note



## PARTS LIST

**Resistors; all are 1/8 or 1/4-W, 5%**

R1, R5—3900 ohms  
 R2, R6, R11, R31—15,000 ohms  
 R3, R7, R15—330 ohms  
 R4, R9, R12, R14, R16—R19, R35—100 ohms  
 R8, R13—10 ohms  
 R10—680 ohms  
 R20—10 ohms, 1/4-W  
 R21—22 ohms  
 R22—100K-ohms potentiometer  
 R23—22,000 ohms  
 R24, R29—100K ohms  
 R25—33,000 ohms  
 R26—4700 ohms  
 R28—470 ohms, 1/4-W  
 R30—2200 ohms  
 R32, R33—1000-ohm potentiometer  
 R34—15 ohm  
 R36—1000 ohms  
 R37—3300 ohms

**Capacitors**

C1—56 pF, NPO, ceramic disc  
 C2, C12—33 pF, NPO, ceramic disc  
 C3, C7, C19, C22, C38, C47—0.01  $\mu$ F, ceramic disc  
 C4, C6, C8, C13, C14—470 pF, NPO, ceramic disc  
 C5—82 pF, NPO, ceramic disc  
 C9, C11—15 pF, NPO, ceramic disc  
 C10—2.2 pF, NPO, ceramic disc  
 C15, C17, C19, C21, C25, C27, C33—2-10-pF, trimmer  
 C16, C32—1 pF, NPO, ceramic disc  
 C18—2-18 pF, or 2-20-pF-trimmer  
 C20, C23, C24, C45—470 pF, ceramic chip  
 C26, C30, C31—100 pF, ceramic chip  
 C28, C29—22 pF, ceramic chip  
 C34—5 pF, silver mica  
 C35—C37—1  $\mu$ F, 50 V, electrolytic  
 C39—10  $\mu$ F, 16 V, electrolytic  
 C40—3-40 pF, trimmer  
 C41—220 pF, NPO, ceramic disc  
 C42—470 pF, NPO, ceramic disc  
 C43—220  $\mu$ F, 16 V, electrolytic  
 C44—10  $\mu$ F, 16 V, tantalum chip  
 C45—0.01  $\mu$ F, ceramic chip  
 C46—100 pF, NPO, ceramic disc

**Semiconductors**

Q1, Q2—2N3563, transistor  
 Q3—Q5—MPS3866, transistor  
 Q6—MRF559, or MRF627 transistor  
 Q7—MRF630, transistor

Q8—2N3565, transistor  
 Q9—MPF102, transistor  
 Q10—2N3906, transistor  
 Q11—2N3904, transistor  
 Q12—MJE180, transistor  
 D1—1N757A, diode  
 D2—MV2112, varactor diode  
 D3—1N914, diode  
 D4—1N4007, diode

**Inductors**

L1—L14—See table 1.

**Other components**

XTAL1—52.5-62.5 MHz

**Note:** Kits for this project are available from North Country Radio, PO Box 53, Wykagyl Station, New Rochelle, NY 10804. Two different kits are available; one is a low-power, the other is a high-power version. Those kits include the PC board and everything on it, except jacks, connectors, batteries, power-supply components, and case. Those are not included, because individual hobbyists may have their own preferences and interface requirements. The author recommends that those components be obtained at another supplier.

The Low-Power Kit w/ATV crystal for operation on 439.25 MHz costs \$79.95, plus \$2.50 for shipping and handling; the 2-W Kit w/ATV crystal for operation on 439.25 MHz costs \$104.95, plus \$2.50 for shipping and handling. Extra crystals for CH14/CH15 operation are \$6.50, plus \$1.50 for shipping and handling. The PC board only, plus cores, chip capacitors, and D2 (a partial kit) cost \$49.95, plus \$2.50 shipping and handling. The Video-Link transmitter, Radio-Electronics, February, 1986, plus a reprint of the article, costs \$69.95, plus \$2.50 shipping and handling. Crystals can be purchased separately from Crystek Corporation, PO Box 06135, Fort Myers, FL 33906.

that Q6 draws about 130 mA at modulation peaks (sync tips).

Also, Q6 supplies between 300- and 500-mW drive to Q7, an MRF630 (Q6 and Q7 are similar in their operation). RF-choke L12 functions exactly the same as L10. Collector matching-network L13/C33, together with mica C34 match the 50-ohm load impedance to the optimum collector load-impedance needed by Q7. Note that a 50-ohm load must always be present at J2, otherwise Q7

may be damaged. A tolerance of  $\pm 50\%$  (25–100 ohms) is permissible here; however, optimum performance is obtained with a 50-ohm load.

Suitable 50-ohm coax must be connected from C34 (on the PC board) and J2, with short connections (a 1/4-inch or so). Any length of coax can be used, but for the best results, keep it short. We used RG174/V PVC type, but teflon coax (RG188/U) would be better. From J2, a standard coax (RG8U, RG58/U, etc.) will do. Re-

member, feedline loss must be avoided as it can be very high at 420 MHz and up.

**Video feed**

Input video from J3 (standard 1-V p-p negative sync.) is fed through C43 to clamp-diode D3. Note that C43 is apparently incorrectly polarized; that is to allow for video equipment that may have a DC component of up to 16 volts at the video output. If you do not expect to encounter that, you can reverse the polarity of C43—if you wish. When turned around, the low reverse voltage (0.6 V) appearing across it doesn't seem to do any harm. Diode D3 clamps the maximum negative input level to  $-0.7$  V, and avoids serious over-modulation at the sync tip levels. If you wish, you can DC couple from J3 directly into R32, the video-gain control, if your equipment interface permits. Also, note the optional 82-ohm termination (R32A) is not on the PC board, but is soldered across J2. Use it unless you're in a situation where loop-through (several other video loads in parallel) is required. It was not placed on the PC board so that possibility would not be compromised.

Video-gain control R32 feeds the base of video-amplifier Q11. Video-amplifier Q11's collector is fed by current-source Q10, which is biased by R34, R35, and R36 to about 50-mA of collector current. That permits Q11's collector to supply plenty of drive to modulator Q12, and eliminates the need for a low-value decoupling resistor from Q11's collector to the power-supply rail (+12V); therefore, Q12's base can approach  $V_{cc}$ , and allows a higher positive swing of Q12's emitter than a resistor from Q11 to +12V would permit, due to Q12's base-drive needs.

Modulator Q12, an MJE180, is configured as an emitter follower. It must supply all the current to Q6, Q7 (or Q5), have a low supply impedance, and high slew rate. The low impedance is necessary for both full RF power output, and to control the parasitic-oscillation tendencies in power amplifiers Q6 and Q7. The load tends to be capacitive due to the bypassing from C26 (somewhat), C30, and C31.

In tests, Q12 can supply nearly 12 volts of video into a 10-ohm load, at 1.2 amps; therefore, Q12 must be heat sunked. To establish both Q-point,



video gain, and bandwidth, R37 provides feedback around the modulator; however, R33 sets the exact Q-point (voltage seen at point A, Q12's emitter), under zero-drive conditions at about 5- to 6-volts DC, to Q6 and Q7. R33 is adjusted for maximum undistorted symmetrical video at point A, while R32 controls video drive to Q11. Supply bypassing must be effective at Q12's collector due to the high current and fast waveforms handled. The main supply bypass, C44, a 10- $\mu$ F, 15-volt, tantalum chip was used because standard electrolytics are somewhat less effective.

### Power feed

DC power is fed to the transmitter at J4. Diode D4, a 1N4007, is provided to serve as reverse-polarity protection. It's cheap insurance against inadvertent damage to Q6, Q7, Q10, Q11, and Q12, should the negative and positive leads of the power supply be reversed by accident. Diode D1 is connected directly across J4. The 12-volt supply (11–14 V is OK) may come from Nickel-Cadmium batteries, an auto's electrical system, or any kind of AC-operated power supply.

### Audio feed

Audio is fed to gain control R22 from jack J3. Input level should be between 10 mV and 1 volt at high impedance, allowing direct interfacing with most microphones, or other audio sources. From R22 the audio is coupled through C35 to Q8, which is biased from R23, R24, and R25. Bypass C36 will prevent audio degenerative feedback, and loss of gain. Collector-load R26 supplies DC to Q8, while C37 blocks DC and couples audio through R27 to the frequency modulator.

Note that no pre-emphasis (high-frequency boost) has been used. If you want to use it, for better high-frequency audio response, change C37 to 0.001  $\mu$ F, and set the gain-control R22 up higher to compensate for loss. The author found that pre-emphasis was unnecessary for most applications.

Audio is coupled to the varactor-diode D2, an MV2112, where R29 biases D2 at 9 V. The varactor diode varies its capacitance at an audio rate from 56 pF at 4 V, to about 33 pF at 9 V. The capacitance of D2 appears across 4.5-MHz oscillator coil L14.

Then, Q9, an MPF102 FET, together with C41, C42, C40, and L14 form a Colpitts RF oscillator operating at 4.5 MHz. Trimmer C40 is used to set the frequency to exactly 4.5 MHz, while toroidal coil L14 is used to minimize stray magnetic field generation.

The audio voltage on the DC bias causes D2 to change capacitance, which shifts the oscillator frequency causing frequency modulation (FM) of the 4.5-MHz generated in Q9, the Colpitts oscillator. Bias for Q9 is provided by R30, while R31 couples the audio subcarrier (4.5-MHz FM) into the video amplifier, which modulates it and the video onto the RF.

Zener-diode D1, R28, and C38 and C39 (which provide bypass) supply a regulated 9-V DC voltage to Q9, and varactor D2. The regulation prevents oscillator drift if the supply voltage were to vary. A frequency counter can be connected to point A to set C40 to exactly the value needed for 4.5-MHz audio subcarrier.

Looks like we've run out of space. Next month we'll focus on construction techniques, like how to wind coils, how to solder tantalum-chip capacitors, and circuit modifications.

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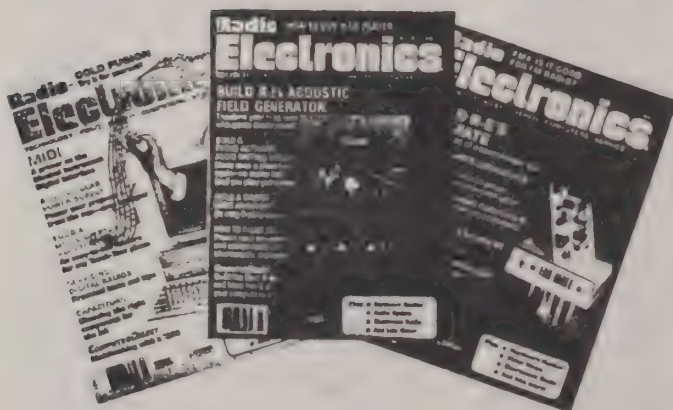
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# BUILD THIS

# AMATEUR

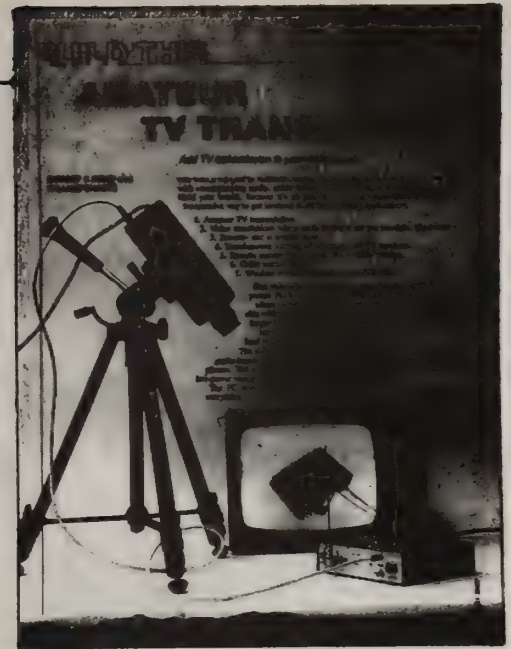
# TV

# TRANSMITTER

## PART TWO!

*Get in the picture with our television transmitter.*

**WILLIAM SHEETS and RUDOLF F. GRAF**  
**K2MQJ KA2CWL**



LAST MONTH WE ANALYZED THE TV transmitter circuitry in great detail, describing the function of virtually every transistor, capacitor, inductor, and resistor. Now we'll present the construction techniques in the same detail. They should pose no special problems, but your best bet is to duplicate the author's prototype as closely as possible. That's because when working with ultra-high-frequency RF, such things as PC-board layout, component placement, and especially lead lengths become critical.

### Assembly hints

As long as the author's design is exactly duplicated, you shouldn't encounter any *off the wall* UHF problems, so follow these suggestions without compromise:

1. As you assemble this project, use only the parts specified in the Parts List because ultra-high frequency circuits are sensitive to changes in component type and value. Also follow the author's parts placement as closely as possible.
2. Lead lengths should be kept short. Handle the surface-mount components and ferrite beads with extra care. The  $\frac{1}{10}$ -watt resistors and miniature NPO ceramics should have short leads, and close component spacing.
3. Wind your own slug-tuned coils with available materials, rather than using commercial, hard-to-get factory-made types. That gets rid of the coil headaches. If the dimensions are followed, no problems should result.

As shown in Fig 1, you'll find that the coils are easy to wind, and the largest ones have only eight or nine turns of wire. In fact, several are only loops or pieces of wire because the inductors required at 420–500 MHz are usually in the 0.01 to 0.1-microhenry range. Complete technical data is compiled in Table 1.

4. Pay particular attention to supply bypassing. We have incorporated a tantalum chip capacitor to guarantee good bypassing. By keeping everything compact, and by using a shielded, double-sided PC board with good RF bypassing, all the possible "horrors" associated with VHF and UHF circuitry can be done away with.
5. The PC board is compact and parts are small, so a small iron with a pointed tip is recommended, especially for soldering the chip capacitors.
6. Use only 0.062-inch thick epoxy-fiberglass PC-board materials. Other materials and thicknesses could be used, but may result in different tuning conditions, and stray capacitances. Don't use paper-base phenolic materials; they're too lossy at UHF frequencies.
7. Transistor Q12 must be heat-sunked because it must dissipate up to 3 watts. The method shown in Fig. 2 has proven adequate if at least 1-ounce copper is used. On the other hand, Q7 is adequately heat-sunked if the metal case is soldered to the PC-board ground plane.
8. Solder as many component leads as possible (that pass through the ground

plane) to the top and bottom of the board. In particular, the ground lugs on all trimmer capacitors should be soldered on both sides, and also the resistors that have one side connected to ground. The idea is to ground as much of the ground plane to the ground foil on the component side, in as many places as possible; that's especially important around Q4–Q7.

9. Use chip capacitors where specified. Do not substitute ordinary leaded capacitors.

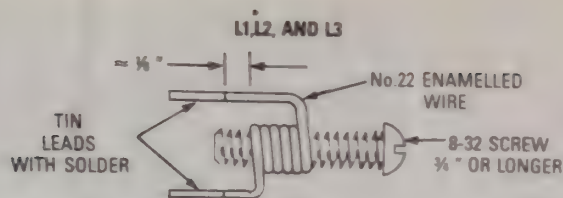
10. Keep all component leads as short as possible, and as close to the board as possible.

11. Take care to make coils as accurately as possible. While some errors can be tolerated, accurate work will make tuneup easier.

### Parts installation

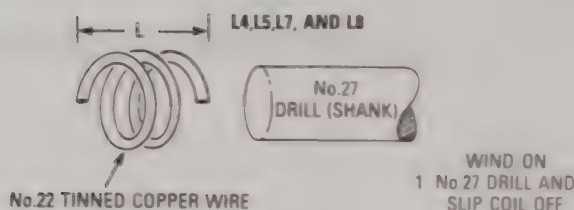
Figure 3 shows the Parts-Placement diagram for the TV transmitter. First install all resistors and then diodes D1 and D3. Don't forget the ferrite beads on R15, R17, R19, and R21. Next install all disc ceramics (0.01  $\mu$ F and 470 pF), and then the NPO capacitors. Now install potentiometers R22, R32, and R33, soldering the grounded side of R22 and R33 to both sides of the PC board. Install all trimmer capacitors. Note that C18 and C40 are different from the rest. Solder ground tabs of all trimmers to both top and bottom of the PC board. Install transistors Q1 through Q5, and Q8 through Q11, but don't install Q6, Q7, or Q12 yet.





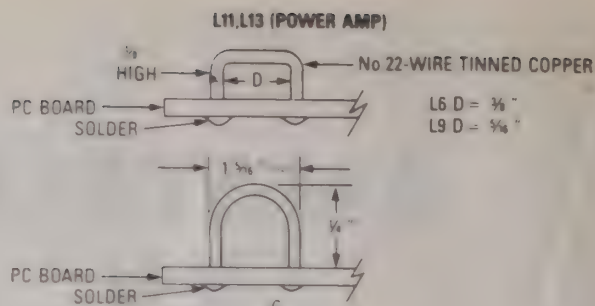
1. WIND No. 22 WIRE IN THREADS THE REQUIRED No. OF TURNS. CLEAN, TIN, AND FORM LEADS AS SHOWN
2. REMOVE THE SCREW FROM COIL BY ROTATING IT
3. INSERT SLUG INTO COIL BY ROTATING IT
4. INSTALL IN PC BOARD

a

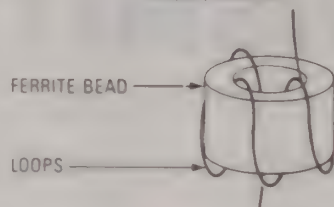


WIND ON  
1 No 27 DRILL AND  
SLIP COIL OFF

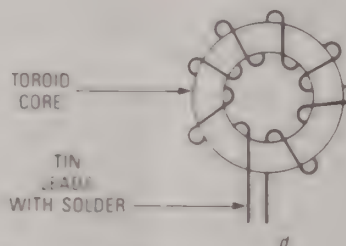
b



L10, L12, AND L14



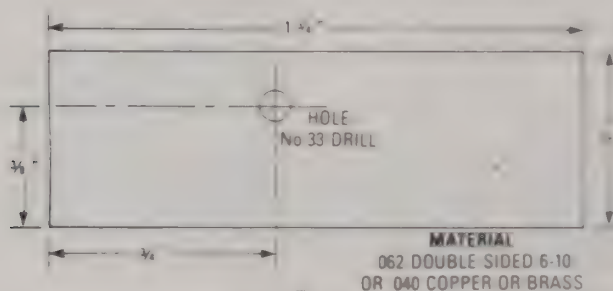
1. FOR COILS L10 AND L12:  
LOOP 3 TURNS OF No. 22  
ENAMELLED WIRE  
THRU FERRITE BEAD—  
NOT CRITICAL



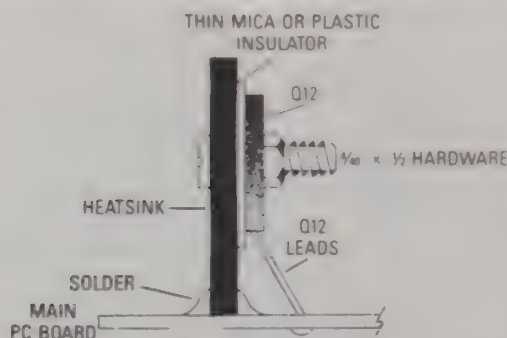
2. FOR COIL L14:  
8 TURNS OF No. 22  
ENAMELLED WIRE  
ON TOROID

d

FIG. 1—IF YOU WANT TO CONSTRUCT THE COILS BY HAND, you have to wind them on the threads of a screw (a), the shank of a drill bit (b), using measured bends (c), or around a ferrite bead (d).



c



1. MOUNT Q12 WITH 1/2" 4-40 SCREW AND NUT
2. CAUTION - USE INSULATOR (MICA OR TEFLON) BETWEEN TRANSISTOR AND HEAT SINK
3. COLLECTOR (MIDDLE) TERMINAL Q12 SHOULD SHOW NO ELECTRICAL CONNECTION TO HEAT SINK

b

FIG. 2—THE ALUMINUM PLATE THAT IS USED AS A HEAT SINK FOR Q12 also functions as an RF shield for transistors Q6 and Q7.

Wind and install L1 through L9, and L14. If you're building the low-power version, leave out any components associated with Q6 and Q7, except L9; go ahead with the modification shown in Fig. 4, and be sure to omit C22. Install chip capacitors C22, C24, C44, and C20.

Check the PC board for shorts, solder bridges, and trim away any excess foil with a sharp knife (X-acto type or equal). Make sure that excess foil on the top side is not touching any component leads that are not intended to be grounded. Slight mis-registration of the top foil during PC fabrication may cause that.

Now install Q12 and its heat sink. Note that the heat sink also serves as an RF shield for Q6 and Q7 (if used). Be sure to solder the heat sink where it butts against the PC board. Note that Q12's case should be insulated from the heat sink. Use a TO-220 insulator (cut to size), or a scrap of mica, mylar, polyethylene, or teflon tape used in plumbing work.

You are now ready to test the main part of the board. If you're construct-



ing the 2-watt version, Q6, Q7, and any associated components will be installed only after the rest of the PC board is tested.

### Testing

After checking your work, measure the DC resistance between  $V_{CC}$  and ground; it should be greater than 200 ohms. If it's lower than that, check your work again for the cause before proceeding any further.

Next, install the slugs in L1, L2, and L3 if you haven't already done so. The slugs should be initially set fully inside the coils. Set R22, R32, and R33 about halfway between extremes of rotation. Set trimmer C40 and all other trimmer capacitors to half mesh. Final settings will depend on the operating frequency, coil-construction technique, and application.

Apply +12 volts after connecting the negative-supply lead to the PC-board ground plane. Immediately observe power-supply current; if it's over 130 mA, there may be a problem. If anything smokes or gets too hot, immediately remove the power and find the problem before proceeding.

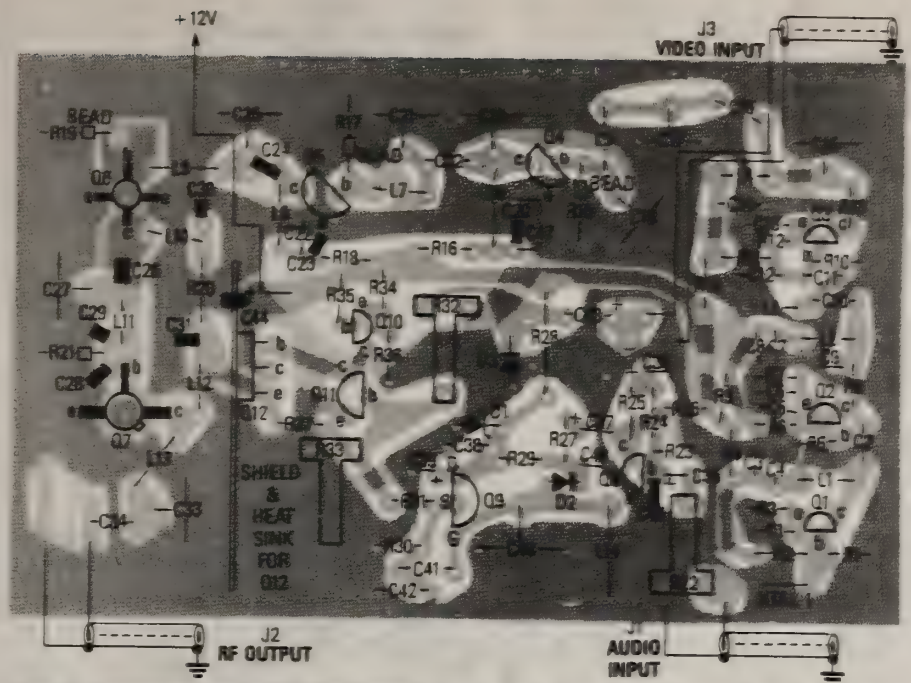


FIG. 3—PARTS PLACEMENT DIAGRAM shows capacitor chips (C20, C23, C24, C26, C28, C29, C30, C31, C45) mounted on the solder side, as is Q6.

If all seems OK, connect a VOM (preferably an analog meter) across R3, and then R7. You should read between 1.5 and 3-volts DC. Next

connect the VOM across resistor R12 Q3; you should read 1 volt or less. Now connect the VOM between point A (emitter of Q12) and ground. Verify

TABLE 1—COIL DESCRIPTIONS L1-L14

COIL	FREQ. RANGE MHz	NO. TURNS & LENGTH	WINDING FORM	NOTES
L1	420-450 (HAM TV) 450-500 (VIDEO LINK)	9½ 8½	8-32 SCREW THREAD	NO. 22 ENAMEL WIRE
L2	420-450 450-500	4½ 3½		
L3	420-450 450-500	5½ 3½		
L4	ALL	3 TURNS ¼" LONG		
L5	ALL	4 TURNS ¼" LONG	NO. 27 DRILL (0.144" DIA) SPACE TURNS	MADE WITH NO. 22 TINNED COPPER
L7	ALL	1½ TURNS ⅛" LONG		
L8	ALL	2½ TURNS ⅛" LONG		
L6, L9, L11, L13	ALL	PER FIG. 1		
L10, L12	ALL	PER FIG. 1	NONE (PC BOARD)	NO. 32 ENAMEL WIRE
L14	4.5 MHz (NTSC SOUND SUBCARRIER)	8 TURNS NO. 22 ENAMEL	FERRITE BEAD	
			TOROID	NO. 22 ENAMEL WIRE

**NOTE:** Due to individual winding technique and normal circuit tolerances, L1, L2, L3 and L14 may require one turn more or less than shown in Table 1. L4, L5, L7 and L8 may have to be squeezed or spread lengthwise. All dimensions are taken from average of several working units. Individual units vary somewhat from given dimensions due to tolerances, winding techniques, and installation.



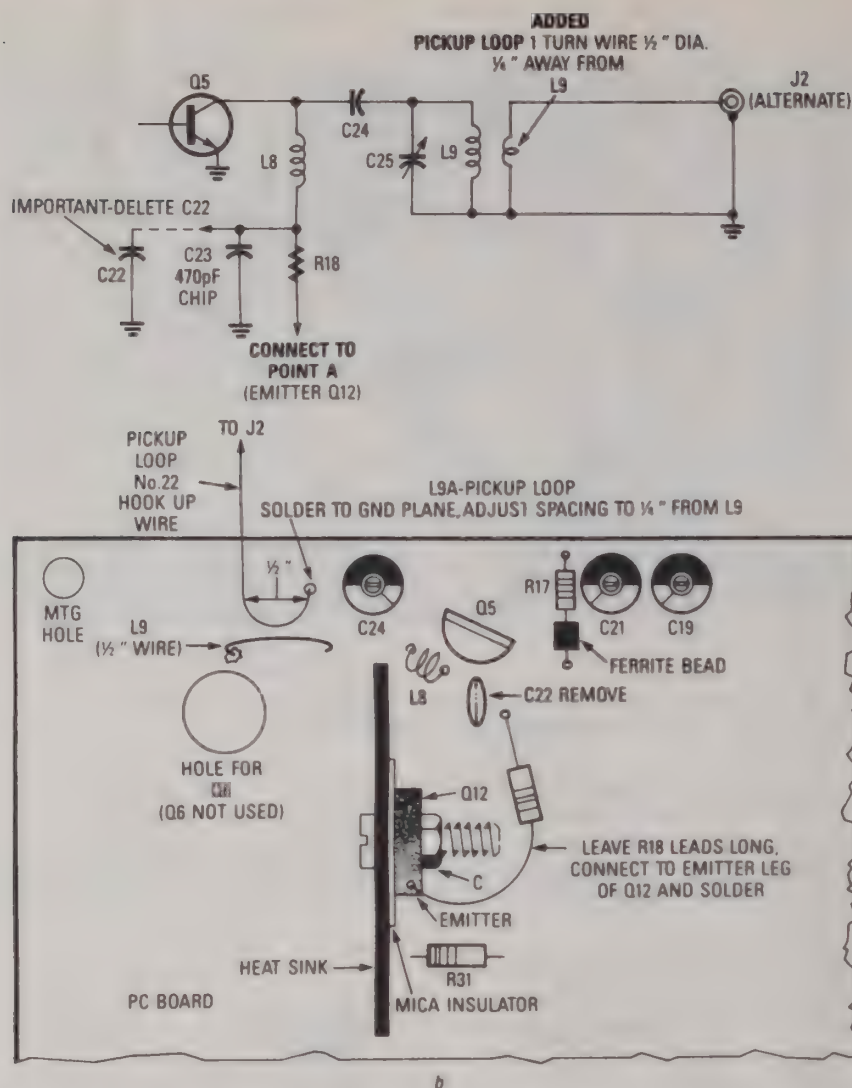


FIG. 4—TO OPERATE THE UNIT AT LOW POWER you should follow schematic (a) and assembly modification (b).

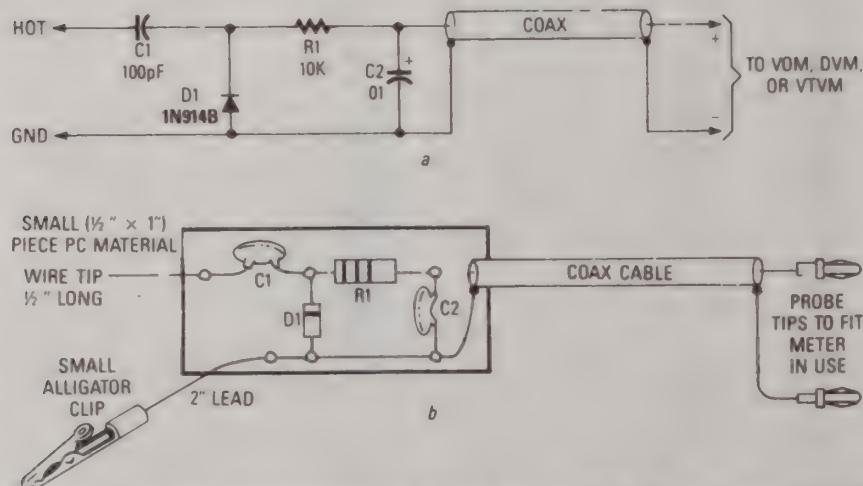


FIG. 5—HERE'S AN RF PROBE YOU CAN BUILD for your DMM, VOM, or scope. It's helpful in adjusting the transmitter for peak power.

that adjusting R33 through its full range will vary the voltage at point-A

between less than 5 volts to greater than 11 volts. Set R3 for full voltage

## PARTS LIST

All resistors are 1/2 or 1/10-watt, 5%.

R1, R5—3900 ohms  
 R2, R6, R11, R31—15,000 ohms  
 R3, R7, R15—330 ohms  
 R4, R9, R12, R14, R16–R19, R35—100 ohms  
 R8, R13—10 ohms  
 R10—680 ohms  
 R20—10 ohms, 1/4-watt  
 R21—22 ohms  
 R22—100,000-ohms potentiometer  
 R23—22,000 ohms  
 R24, R29—100,000 ohms  
 R25—33,000 ohms  
 R26—4700 ohms  
 R28—470 ohms, 1/4-watt  
 R30—2200 ohms  
 R32, R33—1000-ohm potentiometer  
 R34—15 ohm  
 R36—1000 ohms  
 R37—3300 ohms

### Capacitors

C1—56 pF, NPO, ceramic disc  
 C2, C12—33 pF, NPO, ceramic disc  
 C3, C7, C19, C22, C38, C47—0.01μF, ceramic disc  
 C4, C6, C8, C13, C14—470 pF, NPO, ceramic disc  
 C5—82 pF, NPO, ceramic disc  
 C9, C11—15 pF, NPO, ceramic disc  
 C10—2.2 pF, NPO, ceramic disc  
 C15, C17, C19, C21, C25, C27, C33—2–10-pF, trimmer  
 C16, C32—1 pF, NPO, ceramic disc  
 C18—2–18 pF, or 2–20-pF trimmer  
 C20, C23, C24, C45—470 pF, ceramic chip  
 C26, C30, C31—100 pF, ceramic chip  
 C28, C29—22 pF, ceramic chip  
 C34—5 pF, silver mica  
 C35–C37—1 μF, 50 volt, electrolytic  
 C39—10 μF, 16 volt, electrolytic  
 C40—3–40 pF, trimmer  
 C41—220 pF, NPO, ceramic disc

(greater than 11 volts) at point A for now.

Measure the voltage at Q8's collector; about 4 to 7 volts is OK. Next measure the voltage across D1; it should be between 8- and 10-volts DC. If it is more or less, that indicates a problem in Q8, Q9, or the associated circuitry. Check for 8- to 10-volts across D2. If it reads 1 volt, D2 is installed backwards or is shorted.

If all is good up to this point, install crystal XTAL1, connect a VOM across R7, and apply power. Tuning the oscillator is done as follows: Slowly back L1's slug out of the winding. You'll find that the voltage across R7 will suddenly increase, then slowly decrease as the slug is tuned. Adjust



C42—470 pF, NPO, ceramic disc  
 C43—220  $\mu$ F, 16 volt, electrolytic  
 C44—10  $\mu$ F, 16 volt, chip tantalum  
 C46—100 pF, NPO, ceramic disc  
 C47—0.01  $\mu$ F, ceramic chip

#### Semiconductors

Q1, Q2—2N3563, transistor  
 Q3—Q5—MPS3866, transistor  
 Q6—MRF559 or MRF627 transistor  
 Q7—MRF630, transistor  
 Q8—2N3565, transistor  
 Q9—MPF102, transistor  
 Q10—2N3906, transistor  
 Q11—2N3904, transistor  
 Q12—MJE180, transistor  
 D1—1N757A, diode  
 D2—MV2112, varactor diode  
 D3—1N914, diode  
 D4—1N4007, diode

#### Inductors

L1—L14—See table 1

#### Other components

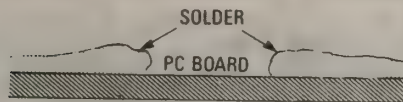
XTAL1—52.5-62.5 MHz

**Notes:** The following kits are available from North Country Radio, PO Box 53, Wykagyl Station, New Rochelle, NY 10804: Low-Power Kit w/ATV crystal for operation on 439.25 MHz, \$79.95 plus \$2.50 shipping and handling; 2-Watt Kit w/ATV crystal for operation on 439.25 MHz, \$104.95 plus \$2.50 S/H; extra crystals for CH14, CH15 operation, \$6.50 plus \$1.50 S/H; PC board only plus Cores, chip capacitors, and D2, (partial kit), \$49.95 plus \$2.50 S/H; Crystals can be purchased separately from Crystek Corporation, PO Box 06135, Fort Myers, FL 33906. Kits do not include jacks, connectors, batteries, power-supply components, or case.

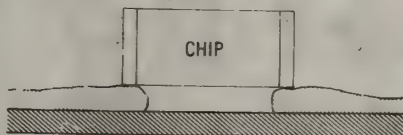
the slug for maximum voltage (3 to 5 volts), then back out the slug for about a 10% drop to ensure stable oscillation. As a check, a frequency counter connected to the junction of C2 and C5 should indicate the crystal frequency. An unstable reading indicates that the crystal is not controlling the frequency. If that's the case, try re-adjusting L1.

Here's how to tune the 1st doubler. Connect the VOM across R12, and adjust L2 and L3 for maximum voltage (about 1 to 2 volts). If adjusting the L1 and L2 slugs doesn't peak the voltage, then add or subtract a turn from the coil as required, after first checking C9, C10, C11, and C12 for correct values.

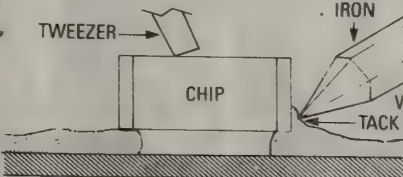
#### STEP 1: TIN AREA WHERE CHIP IS TO BE INSTALLED



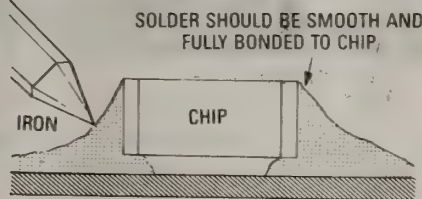
#### STEP 2: PLACE CHIP ON BOARD



#### STEP 3: TACK ONE SIDE WHILE HOLDING WITH SMALL PLIERS, TWEEZERS, ETC. BE QUICK



#### STEP 4: NOW SOLDER BOTH SIDES. DO NOT OVERHEAT



#### STEP 5: INSPECT FOR GOOD CONNECTION

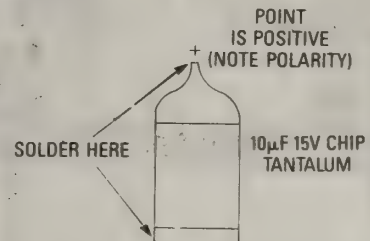
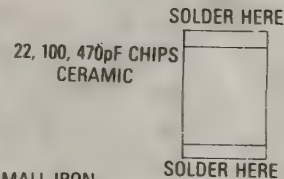
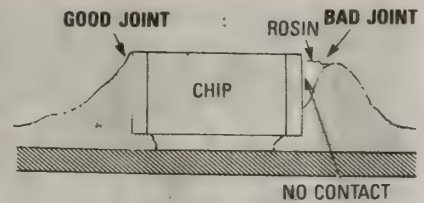


FIG. 6—IF YOU FOLLOW THESE STEPS when soldering the chip components to the PC board, you'll have no problems with them.

Here's how to tune the 2nd and 3rd doublers. Connect an RF probe to the junction of L9 and R19, or to the junction of C25 and L9 if you're building the low-power version. Figure 5 shows you how to build an RF probe if you don't already have one. Adjust C15, C17, C18, C19, C21, and C25 for a maximum reading. You should be able to obtain at least 1.5 volts of RF energy at the junction of R19 and L9 for the high-power version, and about 2 volts at the junction of C25 and L9 for the low-power version. If everything looks good, that checks out stages Q1 through Q5.

To adjust the RF output for the low-power version connect a 47-ohm resistor to J2A (Alternate). Adjust C25 and the position of L9A (Alternate) with respect to L9 for maximum output. Don't couple L9A too close to L9—just enough for about 1 volt across the 47-ohm resistor.

#### Final assembly

If you're building the 2-watt version, now is the time to install Q6 and Q7, and then L10 through L13. You may now install the chip capacitors C26, C28, C29, C30, and C31, but

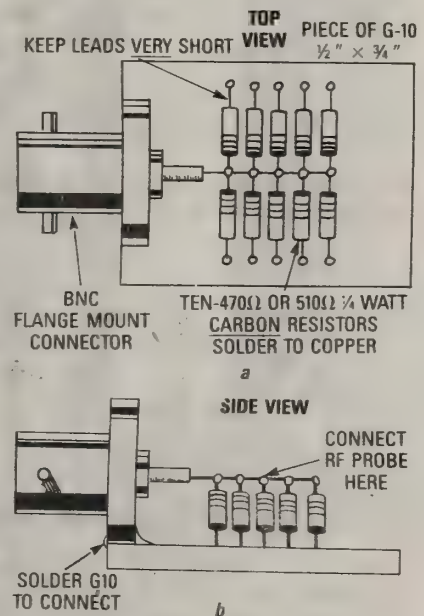


FIG. 7—A DUMMY LOAD SHOULD BE USED while adjusting the power output.

don't overheat them! Make sure that the PC board is tinned in the areas where chips are installed. The best way to install them is to first tack-solder one side to hold it down, solder the other side, and then go back and



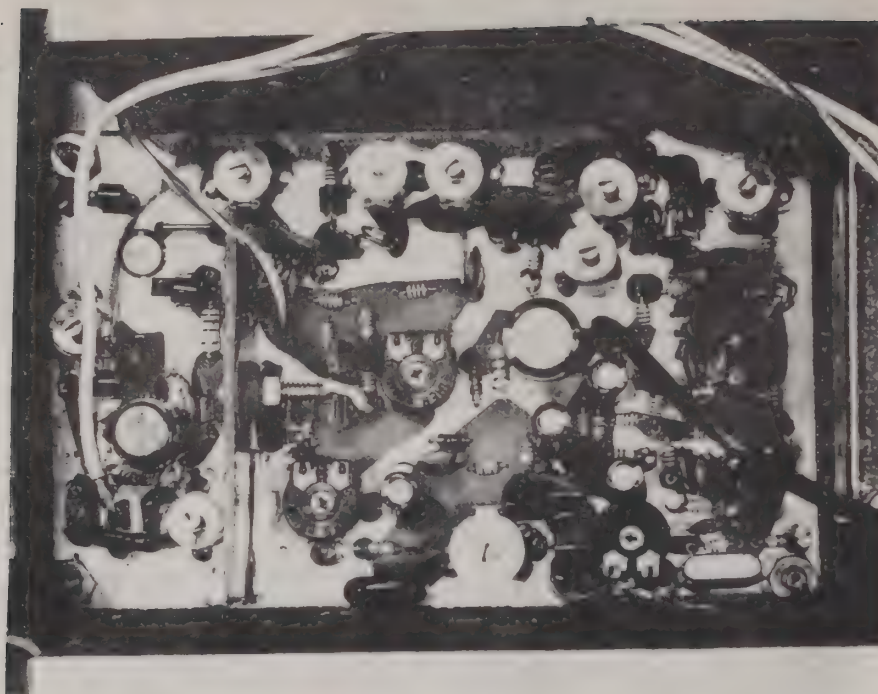


FIG. 8—THE FINISHED PC BOARD has a neat, clean appearance. Sloppy workmanship can not be tolerated on this circuit layout.

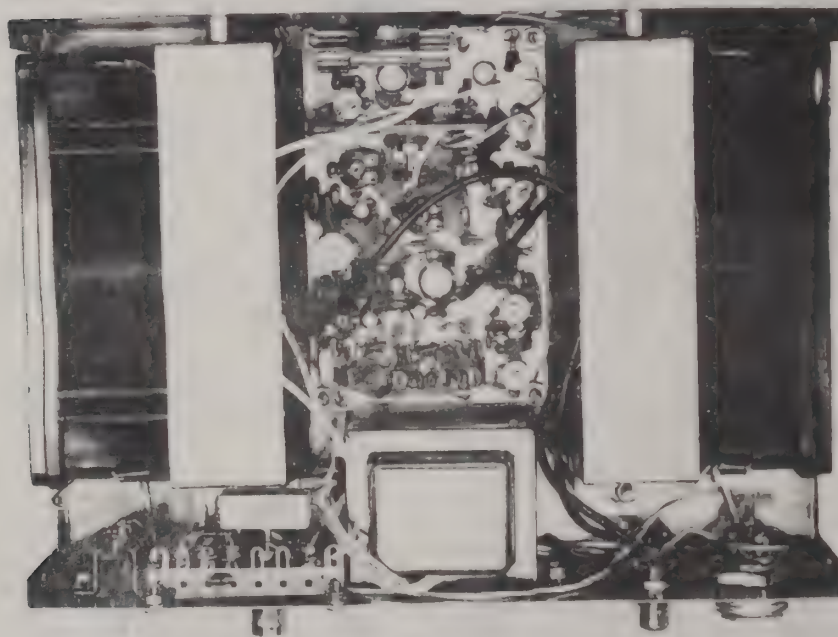


FIG. 9—The AUTHOR'S PROTOTYPE USED 2-Ni-Cd BATTERY PACKS, one on either side of the PC board, which makes the transmitter portable. You'll also notice a power transformer and associated circuitry used for running the transmitter off household AC-line voltage.

resolder the first (tack-soldered) side.

Figure 6 shows you how to solder chip components. Use a 25-watt iron with a pointed tip. Fine-point needle-nose pliers or tweezers should be used to manipulate the chip capacitors.

Finally, install C34 and a suitable

length of small-diameter 50-ohm coax to J2. Check all joints for solder bridges. Make sure that the metal case of Q7 is soldered to the ground plane (top side), and connect its leads to the PC-board underside using as little lead length as possible.

Apply power and quickly adjust C25, C27, and C33 for maximum power into a 50-ohm load connected to J2. You can use a 47-ohm, 2-watt carbon resistor, or the dummy load which can be assembled as shown in Fig. 7. An RF probe can be connected to the hot side of the resistors (center conductor of connector) to read the RF voltage, but an RF power meter is nice to have.

You should get at least 1.5 watts (about 8.5-volts RMS) into the 50-ohm load, which should become warm when operating. Power-supply current will be about 500 mA. Now adjust R33 for an output voltage about half that, or a quarter the power as read on the power meter, if used. Leave the RF load connected as you proceed to the next step.

For either the low- or high-power unit, adjust R33 for about +6 volts at point A (emitter of Q12). Connect a frequency counter to point A, and adjust C40 for exactly 4.500 MHz. Now apply video and audio signals to J3 and J1, respectively. Watch the transmitted image on a TV receiver tuned to the transmitter frequency; adjust the video gain (R32) for best picture contrast and stability, then adjust the audio level (R22) until its level is comparable to a commercial station. Now alternately adjust R32 and R33 for maximum video contrast without seeing any side effects such as instability, audio buzz, or other evidence of clipping. You may also wish to go over all tuning adjustments again for best results. The finished PC board is shown in Fig. 8

### Enclosure

Mount the PC board in a shielded metal-case, as shown in Fig. 9, and connect leads from the board to suitable jacks for J1, J2, or J2A, and J3. Also provide a suitable connector for the 12-volt supply, if desired. The transmitter case can house an AC supply, or batteries for portable operation. Use the right size *Ni-Cd* batteries to handle the 100-mA drain (low power), or 500-mA drain (2-watt unit). Use a BNC-type fitting for the antenna jack, J2.

A suitable antenna would be a 6-inch whip or a center-fed dipole, 12-inches long. For amateur TV, a linear amplifier may be installed between J2 and the antenna for greater power output. For the low-power version, use the 6-inch whip antenna.



## SPECTRUM INTERNATIONAL RESPONDS TO W6HDO ATV QRM LETTER

### USE OF INTERDIGITAL FILTERS MIGHT HELP EASE THE CONFLICT?

[Editors Note] In our last issue (SEP/OCT '90) we published our response to the W6HDO ATV QRM complaint letter sent to many individuals and organizations. Shown below is a letter sent to W6HDO from John Beanland G3BVU of SPECTRUM INTERNATIONAL, INC. regarding the situation.

17 August 1990

Mr. Cliff Buttschardt, W6HDO  
950, Pacific Street,  
Morro Bay, Ca. 93442.

Dear Mr. Buttschardt,

Today I received a copy of your undated letter (written in June?) in which you discuss mutual interference problems between ATV operation and Weak Signal operation on the 70cm Amateur Band. Included with your letter was a copy of letters to you from: Advanced Electronic Applications, Inc. dated 25 June 1990 ATV-Q Magazine dated 26 June 1990, P.C. Electronics dated 27 June 1990 and The SPEC-COM Journal dated 5 July 1990.

You do not specifically state in your letter that you suffer interference from Amateur television signals when you are operating weak signal modes, however that is the message I get from the letters. I hope the following notes give you another viewpoint of the problems, and possible solutions, involved.

As you know, the discussion in the letters centers on the interference to 432 MHz weak signals by the lower sideband of a 434 MHz (video carrier) DSB television transmission, and also the occupation of the "OSCAR" frequency sub-band (435-438 MHz) by the upper sideband signals of the same television transmission. The relative power levels of the different frequency components of a television signal are well documented in the technical literature and are quoted in the referenced letters. I will not discuss power levels here.

Because of the common frequencies, there can be no dispute of the possible mutual interference between the upper sideband signals of a 434 MHz ATV transmission and "OSCAR" mode transmissions in the 435 MHz to 438 MHz sub-band. However, the lower sideband spectrum is a different matter. Vestigial sideband filtering does help.

Let me state here that filtering is not the solution in all cases. Sometimes the frequency plan is such that no filter will cure the problem. However filtering does help in many, many cases; it does allow multiple transmissions, of the same or different modes, to occur simultaneously on adjacent frequency sub-bands. A range of suitable low loss bandpass filters for the VHF and UHF Amateur bands is available from Spectrum International, Concord, Mass. Of particular interest to the current discussion are the "ATV Channel" filters for the 70cm band. The standard models are designed to pass the upper sideband of one of the common ATV channels. They are models: PSf421-ATV, PSf426-ATV, PSf434-ATV & PSf439-ATV.

The filters are also available, to order, manufactured and aligned to the upper sideband of any other ATV channel in the

70cm band. For example a model PSf427-ATV is used in the Chicago ATV Repeater. There are a few ATV groups in the Country who use the TV signal's lower sideband. I know of one Club who use 439.25 MHz lower sideband. They changed from upper sideband to lower sideband because of over-powering interference from "440 MHz FM" repeater operations. Of the four standard frequency designs available from Spectrum International, the demand for the PSf434 ATV filter is minimal compared to the demand for the other three models. This can imply that either: 1. The number of 434 MHz ATV systems is minimal or 2. The 434 MHz users build their own filters or 3. The 434 MHz users buy another manufacturers filter or 4. That few 434 MHz operators use filters.

The PSf ATV channel filters are mechanically rugged units and, with appropriate connectors, will handle several hundred watts of transmitter power (the BNC connector version is power limited by the connector). Thus they can be installed after the TV transmitter's power amplifier in all cases except at those stations which use very high transmit power. This avoids the sideband "regeneration" problem associated with feeding a vestigial sideband signal into a typical, not perfectly linear, power amplifier. (Although seldom mentioned in the literature, it can be mathematically proven, and should be noted, that sideband "regeneration" will also occur in non-linear receivers).

Another facet of possible ATV "interference" to weak signal operation (432 MHz and 435-438 MHz) can be due to intermodulation distortion within the "victim" receiver. For example, a TV carrier at 439.25 MHz carrier and a 446.50 FM carrier will intermodulate to produce a "third order product" at 432.0 MHz. If either of the two (FM or TV)

signals is present by itself in a victim receiver, there will be no observed interference. However with both signals simultaneously present in a non-linear receiver, a third order distortion product will be generated within the receiver. This is a receiver problem (not a transmitter problem) and can only be cured by appropriate action at the receiver. Improving receiver linearity and/or preventing the 439 MHz and 446 MHz energy from entering the receiver, by bandpass filtering of the 432 MHz signals at the receiver's input (and rejecting 439 and 446 MHz signals), are the only cures. In this particular example it would not be an ATV problem or a FM problem; it would be a 432 MHz receiver problem.

Of course, there are many possible interference modes; each one must be investigated fully before an optimum cure can be implemented. The inter-modulation distortion cases are particularly difficult to define; it is always possible for one (or both) of the two "offending" transmissions to be outside of the Amateur band (and to have no energy within the Amateur band!).

I hope the points discussed above are useful and give you a fuller appreciation of possible sources and cures of mutual interference between and to different users of the Amateur 70cm band. If I can be of further help, please write again.

Yours truly,

C.J.Beanland, MSEE, C.Eng., G3BVU/W1.



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# CATV and ham radio

By Steve Johnson, N0AYE

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In the late '70s and early '80s, cable TV and ham radio operators were sometimes like the United States and the Soviet Union in Cold War. Cable systems leaked signal and were more prone to ingress during the early days of midband use and ham operators were being blamed for the interference. Some cable operators thought the hams should just change to another frequency band to eliminate the ingress problems. The hams thought the cable operators should vacate Ch. E to solve the problem. In fact, the ARRL (American Radio Relay League) petitioned the FCC to require cable to vacate the channel.

Lately, like the U.S. and Soviet friction, the CATV/ham cold war appears to be calming down. The NCTA Engineering ARRL subcommittee, headed by Bob Dickinson, reports very little recent conflict. This may be partly due to cable's increased emphasis on signal leakage correction. Not only has the conflict been reduced, NCTA and ARRL comments to the FCC were actually on the same side of recent arguments: the A/B switch isolation requirements, TV Answer, Part 15 rules revisions and converter leakage specifications.

Hams in the cable industry are coming out of the woodwork (see accompanying list) and include such industry notables as Wendell Bailey, Walt Ciciora, Bob Luff and Steve Raimondi.

## ATC amateur radio clubs

Dave Pangrac (WA0RNP), ATC's director of engineering and technology, is responsible for organizing the first ATC amateur radio club in the ATC/TCI-owned Kansas City division. Pangrac found that having employees who were interested in amateur radio provided several advantages to the cable system (see "Ham radio and cable," by Dave Pangrac, *CT*, December 1987, pg. 80).

The primary motivation was to promote technical training. Employees who were amateur radio enthusiasts were learning RF theory through hands-on operation of transmitting and receiving equipment. The newly acquired knowledge could be applied on the job in troubleshooting, signal leakage detection and location, antenna theory, shielding and isolation, etc.

Second, having the club greatly improved relations between the other local hams and the cable company. Now the company was no longer a faceless entity but an organization of living, breathing human beings the local hams knew by first name. The cable company became friend instead of fiend, especially when bucket trucks and generators were made available for Field Day (an annual simulated emergency operation).

The third advantage was in the area of signal leakage. Now that local hams had a friend in the cable business, they called ATC employees to report locations of cable leakage. Leaks could be identified and fixed more quickly. The employees who got involved in hidden ham radio transmitter hunts learned new skills that could be applied to locating leaks.

When Pangrac moved to the corporate office in Denver, he helped ham operators there start a club. Code classes were held before work and at lunch for those interested. Raleigh Stelle (NY0Y), now vice president of engineering of ATC's Austin, Texas, division, surprised the local amateur radio examiners one Saturday morning when he successfully passed all five license level exams in one sitting in addition to the 20 word per minute

## Morse code test.

A station was set up to allow the licensed hams to operate from the office before and after work, and during lunch. The station first consisted of an HF transceiver and vertical antenna. It was later followed by a 2 meter (144-148 MHz) FM voice rig and packet (digital communications) setup.

ATC's National Training Center already had an active station led by Al Dawkins (K0FRP). Dawkins is a high speed CW (Morse code) operator and has contacted 287 countries to date. During a recent amateur radio sweepstakes contest, he took fourth place in CW and second in phone (voice) for the nation. His ham radio background also has proven useful in teaching RF theory and troubleshooting to students at ATC's National Training Center. Dennis Musser (KA5GTM), technical instructor, is a recent addition to the training center from Cox Cable in Oklahoma City.

The ATC Denver Amateur Radio Club took part in early amateur TV (ATV) experiments (what better mode for cable people to operate) with hams from Jones Intercable (Ron Hranac, N0IVN; Doug Greene, NQ9I; and Bob Luff, W3GAC) in March 1988. Hranac later continued work in ATV and helped found a local club, the Western Vision Network.

The ATC Denver station includes packet radio (data transmission) capability. The station acts as a mailbox (sort of a miniature electronic bulletin board) with the ID of ATC and as a relay node for all local operators to use under the call of N0AYE-2. This station was used to assist the Red Cross in passing messages from the Denver area into San Francisco during the 1989 earthquake. Although it was not put into service during Hurricane Hugo, it was standing by ready to help out with any emergency communications if necessary.

The ACKC ARC (American Cablevision of Kansas City Amateur Radio Club) has the distinction of being ATC's first official amateur radio club. The club station was set up in ACKC's engineering office. Now that Pangrac has left, the station is in the capable hands of Noel Scott (KA0TWQ), Don Gall (N0CPN) and Alan Tschirner (KA0TQH), among others. ACKC also provides tower space for amateur repeaters (relay points) in the 145, 220 and 440 MHz amateur bands and an amateur TV repeater. All have been operating without interference to the cable system.

The Oceanic division operates a club station from its office in Honolulu. Kit Beuret (KH6JDE), the division public affairs director, is the chief operator of this club. Presently, the club has eight licensees. Beuret and I recently had a 10 meter (28 MHz) communication between Denver and Honolulu and there is talk of a routine schedule for an industrywide CATV/amateur radio net meeting. In six months the club has contacted all 50 states and 30 countries. As public affairs director, Beuret keeps the rest of the company updated on the club's activities through ATC's *In-Sync* magazine.

Our Memphis division turned an interference problem around and made allies of the local hams. A 2 meter amateur repeater showed up on 145.25 MHz (Ch. E's video carrier) and also picked up signal leakage at various spots around the city. The system voluntarily offset Ch. E while they corrected the problems and everyone was happy. The local hams later began calling in leakage problems they found, greatly assisting the system with its signal leakage program.

## A Cooperative Effort

By Ron Hranac, N0IVN

A group of Denver area ham operators has worked closely with the cable TV industry to establish a relationship that resulted in an amateur television communications system that is used to provide live video of severe storm activity to the National Weather Service. What is unique about the communications system is that much of it was put together with equipment donated by various CATV manufacturers.



The heart of the system is a TV repeater that receives NTSC transmissions in the 70 cm amateur band and retransmits them in the 23 cm amateur band. Situated on Lookout Mountain west of Denver, the repeater provides TV communications coverage as far away as Loveland, Colo. Hams active in this mode of communications connect their camcorders or other video source to a 426.25 MHz transmitter, and with anywhere from one to about 40 watts and a horizontally polarized directional antenna send their pictures and sound to the repeater. The signal is converted to 1253.25 MHz and retransmitted through an omni-directional vertically polarized antenna, delivering near-broadcast quality TV communications.

When severe weather is imminent, the NWS activates their 23 cm receiver. Hams who have been trained in storm spotting load portable equipment into their vehicles and set up at safe observation points where live video of cloud formations and storm activity can be relayed through the repeater to the NWS. During more pleasant weather, the group provides public service and safety communications for events such as parades, marathons, and various civic activities.

Much of the repeater itself consists of modified or custom-built CATV (or related) equipment. The 70 cm receive antenna is a Lindsay low power TV UHF antenna engineered for use on 426.25 MHz. The downlead is conventional .750 CATV trunk cable, and the input bandpass filter is one of Microwave Filter Co.'s 4930 hyperband series. The repeater's receiver is a Scientific-Atlanta 6250 headend demodulator, and a modified DX Communications DSM-160 headend modulator is slated for future use as a separate 1257.75 MHz aural exciter. A Learning Industries audio AGC provides audio compression/limiting, maintaining consistent sound levels among the various repeater users, as well as keeping transmitter deviation close to 25 kHz.

Prior to activating the repeater, the group experimented with simplex TV transmissions on 70 cm, using S-A and DX headend modulators as signal sources, a Jerrold CATV line extender amplifier modified for 1.3 watts output, and Panasonic and S-A set top converters for receivers. One milestone was the first documented BTSC (MTS) stereo audio transmission in the ham bands, sending voice on the right channel, morse code on the left channel, and live video of the event.

In operation for about almost two years now, the repeater would not have been possible except for the generosity of the following companies and the equipment they donated:

The Albany, N.Y., division has had similar success stories with signal leakage problems, according to Bill Kosek (WA2KXY). Another way they have helped public relations is through donations of scrap cable from ends of reels. These 100- to 200-foot lengths of trunk and feeder cable that are usually thrown away can benefit amateur operators. Retired mobile radios can be salvaged as well. Local ham operators can modify the radios for use on the nearest amateur bands.

John Butts (N2JUG) and Richie Hahn (KA2FXH) operate from Manhattan Cablevision in New York. A 10 meter vertical is in place atop the 11 story office building in lower Manhattan. Operation is temporary at this time with no permanent station assembled. Presently, operation is from Butts' desk after normal business hours.

Some CATV vendors have ham clubs as well. Scientific-Atlanta has a very active club at its headquarters in Atlanta, with over 100 amateur licensees among the employees. President Steve Idler (KA9UIE) reports that the club has equipment to operate most of the amateur radio frequency spectrum including HF, VHF, UHF, satellite and packet radio. Pioneer also has an active club including some amateur TV activity, and Magnavox and Jerrold have quite a few hams among their employees as well.

#### Use of amateur radio

It's important to remember that while amateur radio can be used for signal leakage detection, its purpose for two-way communication is emergency communication and support in

addition to hobby-type communication. FCC rules prohibit any business or commercial use of amateur radio. Amateur communication should *not* be used as a supplement to or instead of your system's business radios.

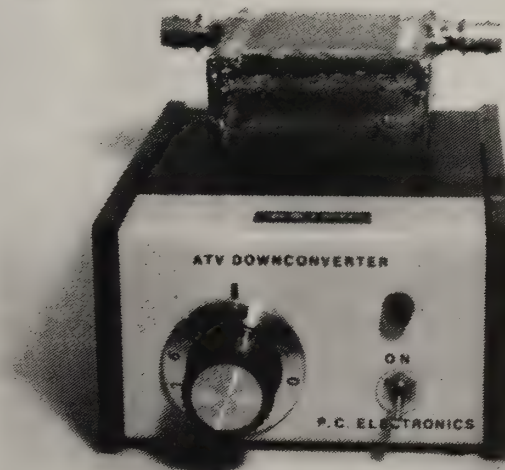
The cold war is over! Many cable people are finding amateur radio to be an interesting hobby with benefits carrying over into the workplace. Involvement in amateur radio can lead to local allies in signal leakage control and have a positive effect on public relations. Technical training, creative experimentation and motivation are other side benefits and above all, it's fun!

This year at the SCTE Cable-Tec Expo, Scientific-Atlanta's ham radio club will be hosting the second annual Cable-Tec Expo ham radio reception Saturday night, 5-7 p.m. Hams and would-be hams are all welcome to attend. *(Editor's note: This year's ham reception had double the attendance of the previous year, and one in three attendees took a door prize home. Plans are underway for a third annual reception at next year's Cable-Tec Expo in Reno.)*

If you are not presently a ham radio operator and would like to be, contact one of your friends from the accompanying list for more information about getting involved in ham radio. Or contact the ARRL at 225 Main St., Newington, Conn. 06111, (203)-666-1541.

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# Ham operators in the CATV industry

The following is a list (in alphabetical order) of amateur radio operators employed in the CATV industry, compiled by Steve Johnson of American Television and Communications Corp.

Name	Call	Company	City, State	Modes	Name	Call	Company	City, State	Modes
Acevedo, Nelson	KP4FEN	CATV Noroeste	San Antonio, Puerto Rico	SSB,FM,CW	Goldsworthy, Steven	KB6TMT	Crescenta Valley	La Crescenta, Calif.	2M/220
Adams, Mark	KA4WCB	S-A	Atlanta, Ga.		Graalman, Mark S.	WB8JKR	Buckeye Cablevision	Toledo, Ohio	160-2/SSB,CW,FM
Adel Sr., John	W5RR	Precision	Richardson, Texas	SSB	Grant, Chns	WOLA	Wavetek	Indianapolis, Ind.	
Alexander, Gary	KE5BS	Post-Newsweek	Altus, Okla.	2FM,SSB	Greco, Vincent	KD2TG	Magnavox	Manlius, N.Y.	
Allen, Fred	KA0YAE	UAE	New Hope, Minn.	FM,SSB, Newsletter?	Greene, Doug	NQ9I	Jonas	Englewood, Colo.	2FM,ATV,Packet,HF
Almeyda Jr., William	KN4BX	Prestige Cable	Cartersville, Ga.	CW,SSB,FM	Grunewald, Peter B.	KA2ZHA	Cablevision	Hudson, Mass.	CW
Amos, Alan	KN10	Jerrold	Stow, Mass.		Gunter, Kenneth S.	W5ZJ	Columbia	San Angelo, Texas	CW/SSB-40-20
Andrews, David	N1ESK	Storer	New Haven, Conn.	2FM,10FM	Guth, Eric	W4TFM	Central VA	Winchester, Va	SSB,CW
Atkins, Gary	W0CGR	CSU Tech Service	Ft. Collins, Colo.	HF/CW		WA6IGR	Advanced Cable		
Bailey, Wendell	KC3BU	NCTA	Washington, D.C.		Hahn, Richard	KA2FXH	MCTV	Denver, Colo.	440 FM
Barnes, Richard	W4IXN	S-A	Atlanta, Ga.		Hammond, Bill	KK4YO	Cable Exchange	New York, N.Y.	
Barnhart, Bill	AA5HH	CADCO	Garland, Texas	SSB	Hampton, Jim	WA3YXX	Starview	Signal Hill, Calif.	
Bartlett, Dave	N0CQC	UAE	Englewood, Colo.		Hanneman, Jerry	WA1PCP	Wander Telecom	Claymont, Del.	2M,10M,UHF,ATV
Baxter, Frank	K2ZLA	Cable Mgmt Svc	Schenectady, N.Y.	2FM,HF/SSB/CW	Hansen, Tom	N8DGD	UAE	San Francisco, Calif	HFVHF
Beckham, Chuck	K4XZV	Voltek Batteries	Doraville, Ga.	VHF,HF	Hanson, Ron	WA0OGS	S-A	Grand Rapids, Mich.	2FM,SSB,CW
Beeman, Paul	KA2MUM	Viacom	Smithtown, N.Y.		Harlin, Michael	WA7AID	TCI West	Norcross, Ga	HF/SSB,RTTY,
Bentley, Bill	KB5HOX	Times Mirror	Midland, Texas	HFVHF,UHF, SSB,CW	Harrington Joel	N7KQJ	KBLCOM	Bellevue, Wash	Packet,2FM,40m
Beuret, Kit	KH6JDE	ATC	Honolulu, Hawaii		Harris, Jerry	K7JPF	Tektronix	Portland, Ore	440,2M,Packet
Blackstone, Larry	W8FZ	Dantron	Milton, Fla.	SSB/CW,80M-10M	Harris, Michael G	N6MH	Century	Beaverton, Ore.	
Blanchard, David	KA0HIB	Municipal Utilities	Coon Rapids, Iowa	CW,SSB,QRP,2FM			Communications	Brea, Calif	HF,UHF
Blumsack, Harvey	W1VIK	Superior Optic	Marietta, Ga		Hart, Gaylord	WB7ODD	Regal	Englewood, Colo.	
Bourne, Dave	WB8TMP	Pioneer	Columbus, Ohio	HF20-10,SSB,Packet	Hart, Jim	N4SV	S-A	Doraville, Ga	CW
Bowick, Chris	WD4C	S-A	Atlanta, Ga		Hartson, Ted	WA8ULG	Post-Newsweek	Phoenix, Ariz	
Bowles, Tom	W7VA	King Video	Seattle, Wash		Hatch, Earl	AB4AO	ATC	Melbourne, Fla	HF-SSB,Packet, VHF,UHF
Boye, Greg	WB8NGA	ATC	Columbus, Ohio		Hawks, Randy	KB0BXY	Hermosa Cablevision	Durango, Calif	HF,2FM
Bray, James R.	W0FBC	ATC	Kansas City, Mo.	HF/CW,SSB	Hawks, Ros	WB0GKL	Hermosa Cablevision	Durango, Calif	HF,2FM
Brillhart, Scott	N5JJZ	UAE	Tulsa, Okla		Haworth, Jim	WA4QPP	ATC	Maitland, Fla	2FM
Bryan, Tim O.	WH6CAD	Jones	Hilo, Hawaii	HF	Hayashi, Ichiharu	JA3ILI	DX Antenna	Kobe-City, Japan	20-10SSB/CW/RTTY, P.A.mor,AMSAT
Burton, Jack S.	WB2CJS	Cablevision	Woodbury, N.Y.	2FM,440FM					CW,SSB,FM
Butta, John	T2JUG	MCTV	New York, N.Y.		Haywood Doyle T	KC9FJ	Applied Instrument	Beech Grove, Ind	SSB,FM,CW,
Bybee, Jerry	N7ESQ	TCI	Portland, Ore		Heim Bob	K8HLH	Erie County	Sandusky, Ohio	Newsletter?
Caci, Joe	KA2OCF	Magnavox	Manlius, N.Y	2FM					
Cappe, Roger	WA4PEA	Cox	Gainesville, Fla.		Heimbach, Paul	WA2YHO	Viacom	New York, N.Y	
Capron, John	WB2RUQ	Phillips	Manlius, N.Y		Hemmings, Brian	KA3CTP	Continental	St Louis, Mo	2M,440
Carey, Bill	KC4BPK	ATC	Fayetteville, N.C		Hemley L Lynn	KB4JXY	American Cable	Columbus, Ga	
Carr, Mike	N4PON	Paragon	St. Petersburg, Fla.	2FM	Henscheid, Bart L	WA7CBO	Texscan	Phoenix, Ariz	
Carvis, Timothy	WB9ULP	NYT Cable TV	Cherry Hill, N.J.	2M,440	Herrman, Tony	KD0ZE	ATC	Kansas City, Mo	HF/CW,SSB
Cerino, Charles	WB3HVM	Comcast	Philadelphia, Pa.	FM	Hill, Tommy	KD4EN	Comcast	Meridian, Miss	HFVHF,Packet
Checketts, Rick	KA0KZB	Jensen Tools	Phoenix, Ariz.	10M SSB,2FM	Hochman Mike	KX6F	Multimedia	Norman, Okla	2FM
Chesney, Tom	WH6CED	ATC	Honolulu, Hawaii		Hodge, Warren	KC4OOS	ATC	Rockledge, Fla	
Ciciora, Walt	WB9FPW	ATC	Stamford, Conn		Hodges, Marsha	KA0UIN	ATC	Kansas City, Mo	2M
Clayton, Francis	AH6X	Kauai Cable	Kekaha, Hawaii	SSB,FM	Hoffman, Kurt	NT8T	Warner	Akron Ohio	CW/HF
Cohen, Jeff	N1ACQ	Harron	Bourne, Mass.	2M,CW40-80	Holmes, Fredrick W	N1GIQ	NE Cablevision	Ayer, Mass	SSB,CW,FM,RTTY, Packet,ATV
Colegrove, Tom	WA6QBO	Lectro	Canyon Country, Calif.	220FM,2FM, 440FM,Packet					
Coombs, Gary	N4OJW	S-A	Atlanta, Ga.		Honhold Fred	W6YKM	King Video	Jackson, Calif	
Cordero, Francisco	KP4CJ	CATV Noroeste	Aguadilla, Puerto Rico	SSB,CW,FM	Hopengarten Fred	K1VR	Lawyer	Lincoln, Mass	HF
Crown, Ron	KH6JI	Kauai Cable	Kalaheo, Hawaii	HF-SSB,2FM, 440FM	Horvath Robert	N8KPS	Continental	Findlay Ohio	2FM,8040M CW
				UHF/VHF,FM, Packet@W4NJA, HF	Hranac Ron	N0IVN	CT	Denver, Colo	ATV Packet,2M, 6M,HF
Davis, Keith	N9IBS	Comcast	Paducah, Ky.		Huf, Ted	K4NTA	Adelphia	Rivera Beach, Fla	
					Hunt Bill	KC4ILF	Marion County Schools	Ocala, Fla.	
Dawkins, Al	K0FRP	ATC	Denver, Colo.	FM,SSB,CW				Atlanta, Ga	
Dean, Brad	K1KEK	TCI	S. Yarmouth, Mass.		Idler Steven	KA9UIE	S-A	Phoenix, Ariz	
Deierlein, Peter	KD2LN	Magnavox	Manlius, N.Y		Jackson, William G	WB8HK	Cable America	Emporia, Kan.	HF,2M
DellaGuardia, Joe	WB2WLY	UAE	Baltimore, Md.	2FM,80-10AM, SSB,CW	Johnson, Glenn	WB7UXS	ATC CARS	Moscow, Idaho	HF/SSB,2FM
				HF/SSB,CW,VHF, Packet,AMSAT	Johnson, Kenneth	WA7YHN	Cablevision	Denver, Colo	2FM
Dickinson, Bob	W2CCE	Dovetail	Bethlehem, Pa.		Johnson, Ray	K8JCB	UAE	Englewood, Colo.	2FM,10SSB,Packet
					Johnson, Steve	N0AYE	ATC	Lander, Wyo	SSB, FM, PACKET
Dickinson, Ed	WA2FAC	Dovetail	Bethlehem, Pa		Johnston Bob	WB7AHL	TCI	Meibourne, Fla.	2FM
Dittow, Doran A.	WA8EOW	UAE	Grand Rapids, Mich.	2FM,6SSB/CW, 80-10SSB/CW	Jones, Herb	KA4NIF	ATC	Manlius, N.Y	
				2FM,HF/SSB,CW	Jordan, Peter	KA2HIG	Magnavox	Midland, Texas	HFVHF
Dudziak, Ted	WA1GPC	EIP Microwave	San Jose, Calif.		Jordan Robert	KB5HPG	Times Mirror	Albany, N.Y	10M/CW,SSB, PACKET
Ehman, Roy	VE8EV	Jones	Englewood, Colo.		Joyner John	KB2IPC	ATC		
Eide, Joe	KB9R	ATC	Eau Claire, Wis.	CW,P,RTTY,AMTOR					
Evanko, Steve	N2HCR	Blonder Tongue	Old Bridge, N.J.	10M-80M CW/ SSB,2FM	Kallina, Henry	WA5VSG	ATC	Englewood, Colo.	HF,2FM
					Karr, Randy	KC4IOT	Channel Master	Clayton, N.C	HF/SSB,
Evans Jr., Bernie	W6JMK	TeSCO	Topanga, Calif		Kasekamp, Marlon L	KK3L	TCI	Cumberland, Md.	VHF/UHF,FM,10FM
Evanyk, Walt	W8KSW	Precision Elec	Richardson, Texas	SSB,AM,FM, CW,FSTV,Packet					160-10/SSB,CW,2FM
					Kaser, Gary F	AB8Y	Adelphia Cable	Richland, Mich.	HF/CW,SSB,2FM
Farmer, Jim	K4BSE	S-A	Atlanta, Ga.		Kaylor, William	WB9SM	Phillips	Knoxville, Tenn	CW,SSB,FSK
Farmer, Jim	N4IBW	Superior	Atlanta, Ga		Kean, Peter	K2AXI	Mystic Star	Rock Tavern, N.Y.	80-10,SSB,CW,AM, FM
Ferguson, Jan	W4REN	Telecommunications	Cocoa, Fla.	SSB,FM,CW, Packet,VHF,UHF	Kellough, Larry	WB9AZO	Cox	Harahan, La.	
		ATC		CW,SSB,FM					UHF/VHF,FM
Ferguson, Michael	KQ2K	Cable Tech	Syracuse, N.Y.		Kelsey, Charles	WB2EDV	Village of	Mayville, N.Y	
Figal, John	WB0CUC	UAE	Denver, Colo.		King, R Michael	WB0NCB	Circuit Doctor	Finco, Colo.	HF,UHF,VHF
Fischer, Dave	W0MHS	Superior Cable	Atlanta, Ga.		Knies, Mike	WB8MMR	ATC	Columbus, Ohio	
Fitch Jr., William A.	KA2AFG	New Channels	Troy, N.Y.	80-10,6.2	Kolins, Jerry	K2PFV	Professional Electric	Schenectady, N.Y	VOICE, DATA, VIDEO
Flessner, Andy	KA9ARM	Insight	La Grange, Texas	2FM,Packet				Albany, N.Y	SSB,AM,FM, CW,AMSAT
Flynn, Mike	KA3DDQ	County Cable	Clarion, Pa.	40CW, 10 SSB	Kosek Bill	WA2KXY	ATC		
Forrest, Mark	WB4HJG	S-A	Atlanta, Ga.						
Friend, Neil	W2AMY	Magnavox	Manlius, N.Y		Kramer, Jonathan	KD6MR	Communications	Lake Forest, Calif.	2FM,Packet
					Krebsbach, Ed	KF7KE	Support	Klamath Falls, Ore.	HF/SSB,
Gall, Don	N0CPN	ATC	Kansas City, Mo				TCI		CW-2FM,Packet
Garner, Rodney	WB4ZWK	S-A	Atlanta, Ga.		Kujat, Matthew C.	WB3FNZ	CATV Service	Freeland, Pa.	SSB,CW,FM,2M, 432,BM
Genochio, Frank	W6RXU	Retired	Santa Clara, Calif.	CW/SSB/HF					



Name	Call	Company	City, State	Modes	Name	Call	Company	City, State	Modes
Kuzmanoff, Chris-Langevin, Larry	WH6CEQ K1GXU	ATC Greaser Media	Honolulu, Hawaii Chicopee, Mass.	160-10 CW, SSB/2M CW,SSB 75SSB,VHF,UHF	Sell, Bob	WB4OEZ	ATC	Maitheuma, Fla.	450 & 6M repeater owner
Larje, David Lemon, Gary Levy, Bob	WZ6V N01ZF K2LET	Intermedia ATC NY Cable Commission	Santa Clara, Calif. Gastonia, N.C.	Silent Key	Sellers, Mike Selwa, Paul Serafin, Neil Sexton, Burl Seymour, Andy Shaw, Bob	K0ED N89K KE0XL K04V N0JPD K88BY	Comcast TriNet Cable Exchange S-A Telecable Pioneer	Fullerton, Calif. Indianapolis, Ind. Englewood, Colo. Atlanta, Ga. Springfield, Mo. Columbus, Ohio	HFSB,RTTY 40-10 SSB/CW,2FM 2FM/10FM & SSB SSB,CW,FM,Packet, 2M,220,ATV,10SSB, Packet SSB
Lewis, Jon Lies, Gene Lloyd, Tom Lonn, Robert Louie, Don	KH6MS NN5A K0CP1 WA6PHN VE7CKL	ATC Jones Vantage Cox Rogers	Honolulu, Hawaii Albuquerque, N.M. Kirksville, Mo. San Diego, Calif. Vancouver, British Columbia Englewood, Colo.	2FM 2FM,220,Packet	Shimko, Gary P. Shine, Daniel Sicard, Don Siebring, Gary Sigler, Glenn E. Skinner, Russ Smith, Bill Sokols, Ray Sotirhos, Jerry	WA8OTR K1N/JX K10SG KA0DWE N8LJY WA8EOX W5USM K9RS K871CS	Precision MA-COM MA-COM MAC Siebring Pioneer UAE CADCO Wavetek Heritage	Richardson, Texas Chelmsford, Mass. Chelmsford, Mass. George, Iowa Columbus, Ohio Montvale, N.J. Garland, Texas Indianapolis, Ind. San Jose, Calif.	HFCW,2M,Packet SSB,CW,2M,Packet 6M,2FM,ATV SSB,CW,FM,Packet SSB/HF/20,40, 80,2FM,220FM 6M,80,40,2FM
Luff, Bob Mackenzie, Kevin MacLeod, Doug Malo, Butch Melson, Tom Marquart, Hugo Marriam, Scott Martin, George E. Maziarz, Joe McArthur, Len McCoey, Cecil McDonald, Stan McDonough, Tom McFadyen, Brian McMillan, John Melling, Chuck Meyer, Ken Michael, Tracy N. Michals, Joe Milner, Ed Money, Marshall Monroe, Jerry Moore, Doug Moore, Marc Moore, Marcus Mountain, Ned Mullan, John Musser, Dennis Myers, Ron	W3GAC WB6BVM N8ASM KK4CU N8RLN N0DYZ KB28DB WD0FJH KB8IU VE3KSU WB4CTF WA4IZI N4YKK N9HJR KA4SSB K3GDZ WB9UY AA8Z KA0GIB WA4OHV N4SIO KC2UT KA0TQJ KB8HMO N4RYD WC4X KD2LQ KA5GTM KH6JQP	Jones J.D. McKay Corp. Comcast Adv Satellite Western CATV Bismark-Mandan Magnavox SW MO CATV NASA Lewis Cablesystems Cox Cable S-A N4YKK MetroVision ATC Capital Cable Door Cablevision TCI ATC CARS Flight Trac Summit Magnavox ATC King Video S-A Wegener Magnavox ATC Comband Technologies	Aloha, Ore. St. Clair Shores, Mich. Ormond Beach, Fla. Torrance, Calif. Bismark, N.D. Manlius, N.Y. Carthage, Mo. Cleveland, Ohio Don Mills, Ontario Norfolk, Va. Atlanta, Ga. Cocoa, Fla. Palos Hills, Ill. Lumberton, N.C. Columbus, Ohio Sturgeon Bay, Wis. Hartford City, Ind. Emporia, Kan. Glen Ellyn, Ill. Woodstock, Ga. Manlius, N.Y. Kansas City, Mo. Tulunga, Calif. Atlanta, Ga. Duluth, Ga. Manlius, N.Y. Denver, Colo.	2FM,AMSAT 2FM 2FM 80,40,15,10 CW/SSB SSB,CW,HF FM,Packet 2FM,10M-SSB 2M FM CW,AM,FM 2FM/440FM,Packet CW,SSB,FM,RTTY HF,2M,Packet HF/CW,SSB HF/CW,SSB 2M,10M,SSB,Packet 2M,10M CW-80M,2FM,440FM 80-20M/SSB,2FM 75SSB,2M,6M,FSTV FM,AM,SSB,HF, VHF,UHF,P,RTTY 2M 2FM,HF/SSB 2FM,HF/SSB FM 2M/440/HF 160-10,2FM,UHF FM FM,SSB,Newsletter? CW,SSB,2FM CW,DX,Contesting HF/SSB,V,U,P,ATV, SAT,AMTR,RTTY 2M 20M SSB/CW 75SSB 40SSB 160-10,2M 2FM 2FM,Packet,CAP 2meter VHF/Packet,AMSAT SSB,DX,SSTV,FSTV FM,SSB,2M,440 CW,SSB,FM,AFSK, ATV HF/CW 2FM,10M,ATV, Packet,AMSAT	Stefle, Raleigh Stephens, Bill Stewart, Columbus Stigberg, Chuck Stofer, Ray Strahan, Dave Strebel, Rich Sutton, Dave Swanson, Pete Tash, Gill Taufill, Sumatale Taudahl, Tax Taylor, Jim Thomas, Ray Thompson, Mike Tinggaard, Neil Tonge, Tim Troutman, Edwin L. Tschimer, Alan Tyrrell, George VanBuren, R.H. VanDamm, Michael Volles, Art Vrooman, Jim Vyverberg, Chuck Walker, Dane Wanderer, Bob Warburton, Peter Warren, Larry Wasleska, Bruce Watt, Philip White, Thomas Wicks, Wayne Wightman, Gary Wilke, Allen Wilkinson, Mike Williams, Robert T. Wiltshire, Dan Winn, Al Witherspoon, Brian K. Wolcott, Mike Wonn, Jim Woods, Emmitt Woux, Tony Wyatt, Tim Yorke, Sal Young, Scott Yunker, Dennis Zeidler Sr., David H. Zhorne, Brent	N4YD N8HEP KA8QVZ NT4U K7JNK N7LSD KA3ANO WA9J KA2IAY WB8WNN WH6CDN W7KCZ K9JT WB8RUQ KA0WJQ WA0HJY KA0MWA WA3TFX KA0TQH K0CPT W5ILH N8MOF N5BZL WA2GSX WB7NMF WB6JNP KT2D G8UGK N4ZE WB9YVT K871QO KB9ACX WA2KEC WA8MCD KE0EN N5IQP K8BFT K888KF KA9CAS KB4RAS WB4OEX W3GCZ KA7NEH VE7CYE KA0TYE WD4NZX N4HLA N6B1 WB9FTB WB9FHI	ATC ALM UAE Eastern Technical Communications White Sands TCI Adelphia UAE Cable Exchange Times Mirror ATC Telecomm The Video Term Telecable ATC UAE ATC Adelphia Cable ATC HP Cablecom Heritage Texcan Magnavox Cox Hughes MW UAE ARCOM Anixter Jones TCI Heritage ESPN Cablevision ATC Precision Century Pioneer Alert Cable TV S-A C-COR Cooke Cablevision ComLink ATC Magnavox ATC Jones LucasFilm UAE	Austin, Texas McHenry, Ill. Grand Rapids, Mich. Richmond, Va. Phoenix, Ariz. Seattle, Wash. Macedonia, Ohio Galesburg, Ill. Liverpool, N.Y. Irvine, Calif. Honolulu, Hawaii Femdale, Wash. Milwaukee, Wis. Springfield, Mo. Kansas City, Mo. Englewood, Colo. Winchester, Va. Kansas City, Mo. Englewood, Colo. Kirksville, Mo. San Jose, Calif. Fort Dodge, Iowa Manlius, N.Y. Spokane, Wash. Torrance, Calif. Pompton Lakes, N.J. Syracuse, N.Y. Bensenville, Ill. Mosinee, Wis. Anaconda, Mont. South Bend, Ind. Englewood, Colo. Kalamazoo, Mich. Kansas City, Mo. Richardson, Texas Portsmouth, Ohio Columbus, Ohio Terre Haute, Ind. Clayton, N.C. Atlanta, Ga. State College, Pa. Cle Elum, Wash. N. Vancouver, British Columbia Kansas City, Mo. Manlius, N.Y. Memphis, Tenn. Spring Valley, Calif. San Rafael, Calif. Galesburg, Ill.	2FM,10M,ATV, AMSAT HF/CW 2FM,440FM,HF, Digital SSB HF DX,2M FWSSB,RTTY SSB,CW,FM 10,15,20,80, 2FM,Packet 80-10/CW/SSB HF/CW/SSB, VHF/UHF/FM 2FM,Packet, HF/CW/SSB 2M,10M VHF/UHF/FM,P RTTY,HF/AM/PS/SSB VHF,Packet 2FM,Packet CW/SSB/160-10, 2FM,440FM 2FM,80-10 SSB 2FM,Packet CW/SSB/160-10, 2FM,440FM AM,FM,SSB,CW 2FM,HF/SSB 2FM HF/CW,SSB SSB,Packet,FM SSB,CW, Novice bands 2M,10M,Packet, HF Net? CW SSB,FM,AM CW,SSB,FM,160-2 2FM,HF/SSB HFSSB,RTTY, Packet,2FM,440FM
Sambol, Don Sanchez, Nestor	K7CS N4UJZ	ATC Storer	Englewood, Colo. Miami, Calif.	HF/CW 2FM,10M,ATV, Packet,AMSAT	Schmidt, Bill	KF4CQ	Superior Telecommunications	Atlanta, Ga.	CW/HF HFSSB/CW, 2FM/SSB,Packet
Schmidt, Jim Scott, Noel	WB9EPW KA0TWQ	ATC ATC	Appleton, Wis. Kansas City, Mo.						

Please send any additions or corrections to Steve Johnson, N0AYE, c/o ATC, 160 Inverness Dr. West, P.O. Box 6659, Englewood, Colo. 80155-6659.



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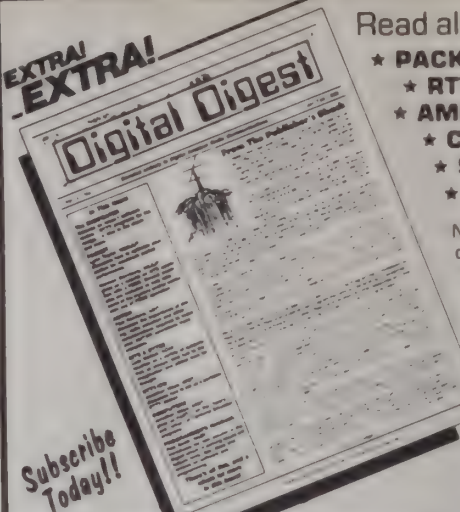
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FOUNDED IN 1932

"EARLY RADIO & TV"  
with Mel Dunbrack W1BHD



Thanks for all the cards and letters wishing me a speedy recovery! I wonder if a metal cane acts as a lightning rod? I'll see next summer.

I want to thank Ray Herbert G2KU who sent me a special letter from far away. He wrote me back in January (received in June) with some interesting statistics. Andy Emmerson contacted him to forward some material about his life and Radio & TV. He lives at 24 Norfolk Avenue in South Croydon, England.

G2KU writes; (edited) "I made a 30-line television in 1933 as a schoolboy and later I constructed a Baird TV. My main work with Early TV was in 1939 when in July/August - we sent "airborne" TV pictures and images over a 400 mile radius from a bomber flying over London on 17 different occasions.

In 1928, Ben Glopp transmitted television pictures "across the Atlantic" from his Amateur station G2KZ which was received in America by Robert Hart W2CVJ. Ben lives near here and is now 95. I believe Robert Hart is still living in the same house and is also 95. The first Amateur to send out 30 line pictures from a "home made" TV studio was G2AO of Eastbourne.

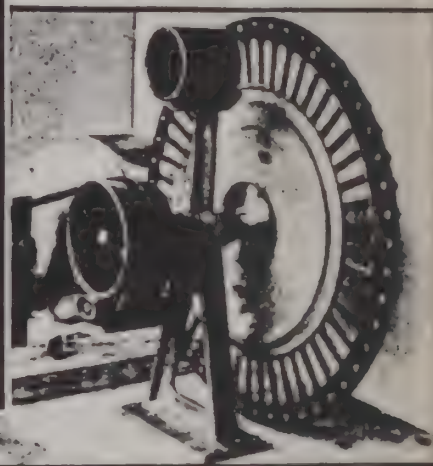
G2AO transmitted on 160 meters received by G5JZ. G2UF transmitted TV on 10 meters in 1935. Baird was showing 120 line COLOR in a London Cinema on a 12 foot by 9 foot screen in December of 1937. He produced the world's first multi-gun COLOR television tube in August of 1944. G2TV was the world's first television transmitting station, licensed in August of 1926 operating 30-line programs. That call is now held by the Baird Museum Amateur Radio Society.

Baird produced the first video recordings in 1927 called PANOVISION. I have found a few of those original discs and found that it is possible to re-produce the 62 year old images by using a computer to assemble the 30-line sections line by line. The results were shown on a monitor screen and photographed.

American George Sheirs did a very good job on Early TV history and one of his articles mentions the details of the G2TV transmitter (Radio News - September 1926, pages 206, 207, 280 and 282). Good luck OM on establishing a USA Ole'Timer's Early Radio and TV Society!" -Ray Herbert G2KU

(W1BHD) Sorry guys that the past couple columns have been a bit short. I am doing all I can to return to health and my writing ability has been hampered. Mike (WB0QCD) - enclosed are some more photographs to show the boys. Next issue: the answer to the question: "WHAT EVER HAPPENED TO CHANNEL ONE?" -Mel W1BHD-TV.

VISION BY RADIO  
Radio Photographs, Radio Photographs  
by C. Francis Jenkins



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2. What was the frequency band coverage of the original Channel 1?
3. What experimental (Amateur) TV station (company) got the first use of Channel 1 to the public. What was their call?
4. What was the date and location of this historic TV stations' unveiling of the first public seen USA TV pictures?
5. Who was the first to be American President that was "on TV"?

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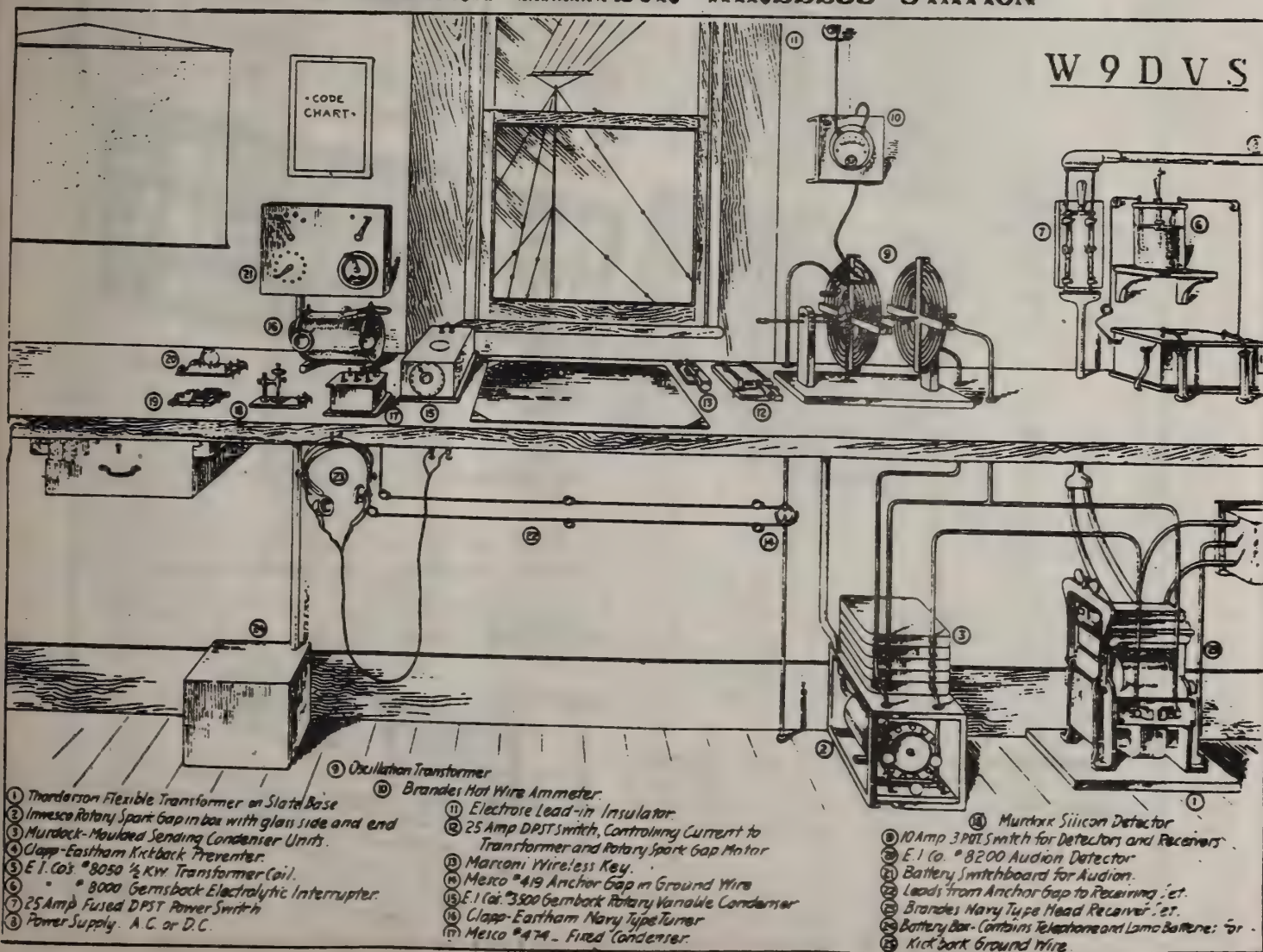
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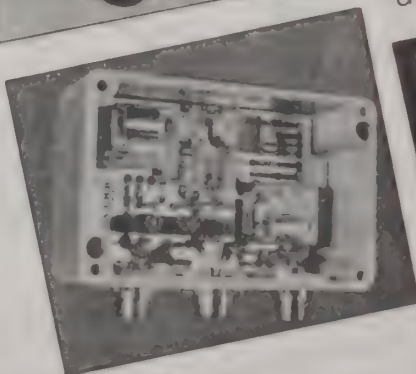
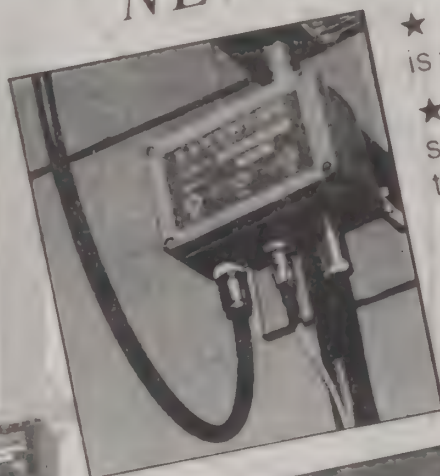




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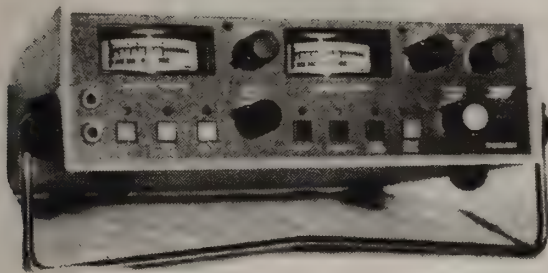
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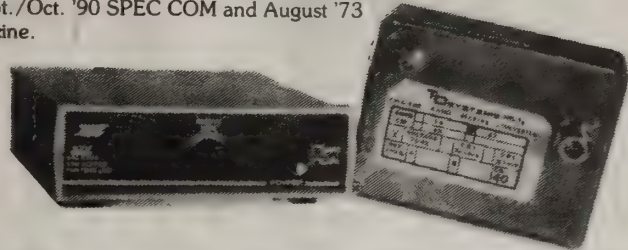
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## "FROM THE WORKBENCH"

with Steve Franklin WB5KGL

430 MHZ. ZIG-ZAG HORIZONTAL  
OMNI ANTENNA with GAIN

by Steve Franklin WB5KGL  
2420 Superior Drive - Suite B  
Pantego, Texas 76013  
(817) 861-5864

WB0QCD of SPEC-COM has been after me for some time now, to take a few moments each month to write a regular BUILDING & TEST type column regarding HAM-TV. Although my time is usually quite limited, I realize the importance of "sharing" learned knowledge with fellow ATV enthusiasts. So, I will try with each published issue, to offer some sort of building project, testing procedure or electronics "food for thought" to fill up a couple more pages in our USATVS Journal.

The concern and worry of "staying horizontal" when constructing an ATV Repeater system for most of the country has certainly now lessened with the successful workability of SLOT designed antennas. Many such systems, as reported by The USATVS, have switched polarizations to remain with a H-plane DX advantage. I was intrigued by LINDSAY's commercial Canadian TZU array which appears to be based on English and German designs of many years ago. Using standard antenna dimension formulas, I set out to design a similar array made out of simple, inexpensive, Fibreglas masting and coated copper wire.

The dimensions given, should work well for 430, 920 and 1250 MHz. I personally have built both the 920 and 1250 MHz. versions and have them both stacked one above the other in a nice neat arrangement for a local Texas ATV/R crossband system. WB0QCD in Iowa is building up a 430 MHz. version (based on my figures and dimensions) for his groups M.A.T.S. ATV Repeater system using PVC plastic tubing (illustrated).

It should be noted, that the drawings presented here in this article ARE NOT geometrically correct orientated. That is to say, they were sketched to give the builder a better view angle of how the separate element bays will appear during the building process to each other. Obviously, if drawn correctly like a photograph, one array would depict just the opposite and would not be very visible at a right 90 degree angle from each other.

I suggest building a 4-bay version first, then the 8 if more gain is needed. A 4 dbd gain, 4-bay version is pictured in design. Build an 8-bay exactly the same way with continued dimensions with a feed point at the center of the 4th bay (6-7 dbd). Use a fairly stiff, solid, copper wire of #14 or #16 (or thicker) gauge material. Select a vinyl, plastic or rubber coated wire for minimum weather exposure rigidity. 1-2" PVC plastic piping or Fibreglas poles can be used for masting. As mentioned, I used Fibreglas for my 920 and 1250 MHz. arrays taken from overpass measuring poles that you see on OVERLOAD escort vehicles. 1/2 inch wire element support crossrods are used to give each side of the diamond shaped wire elements its formation. I recommend also using 3-4 inch additional mini-crossrods (not shown) where the wires all come together near the mast pipe. This eliminates difficult "fishing" and "pulling" of the long wires themselves through the center of the mast section if only holes through the PVC masting are used (as pictured).

Each side of dimension A is square to each other on opposite sides, all of equal length. The EAST/WEST and NORTH/SOUTH facing normally bi-directional patterns of both fed arrays could be alternated somewhat to point in slightly different angles for a more omni-directional radiated pattern. WB0QCD is building his 70 CM. array in this fashion. Each diamond element is hole drilled or cross-arm supported at rotating 45 degree angles (or less). Time must be spent, planning and drilling the needed holes for exact placement. If 45 degree angles are desired, stagger (not all gain will be lost) each bay so that two pairs of arrays will face all 4 directions on the 8-bay version. To decide what pattern of radiation suits your group the best, you must first decide where everyone lives in relation to the erected antenna site or the areas of desired coverage. One extremely long 8-bay version with all elements one above the other stacked on a long pole could be designed with higher gain & bi-directional patterns - but for most situations, the array presented is quite practical.

A standard, industry familiar, 4-1 impedance matching balun is used in connecting a 50 ohm load and feedline to the approximate 200 ohm antenna. I used RG58U which has a 66% velocity factor.



### 8-Bay UHF ZIGZAG Antenna for FSTV

Teflon 141 stock could be used that has a slightly higher 69% v.f. Dimension "D" is given per band for the length of the U-shaped balun cable itself. Pay special attention to the actual "wire jumpers" cross-connections that feed RF to both arrays. Dimension "E" is given for the appropriate jumper wires which can be made out of the same wire element material. Solder and weatherproof all connections points well. All ground shields need to be soldered and united together. Solder tin all exposed cable shielding and tape to prevent oxidization. Fasten the 4-1 balun firmly with tape, strap ties or clamps.

If PVC pipe is used, cap the top and add on a glued, threaded on one end adapter to connect into another mast section of metal pipe (or whatever is used). If side-tower mounted, leave an extra foot or so above the top and below the bottom of the arrays (tubing) sufficient enough for a crossarm holder/support arm to grab hold of it.

Lowest VSWR might be obtainable if the interconnecting jumper wires are moved slightly up and down each side of the attached element array. The models I built did not require this experimentation, however.

The radiated electron flow of the signal travels up and down each diamond shaped, element arm. Cancellation effects null most vertical radiation to make this array a definite horizontally polarized antenna. Unlike flimsy, bulky and much heavier SLOT array systems - the ZIG-ZAG wire array is much lighter and the wind will just blow right through it. Since there is far less surface area, when compared to SLOTS, ice and water build-up is not a major problem.

There are a number of other similar shaped patterns that can be constructed with this type of antenna array (circles, clover leaves, etc.) that would most likely work just as well. I decided to go with a diamond pattern as did LINDSAY in Canada largely because of the ease of construction and shaping using crossarm support pieces. The dimensions, by the way, ARE NOT the same as LINDSAY TZU model commercial arrays. They feed theirs different and use hollow, larger aluminum elements instead of wire.

If you already have a SLOT or some other type H-plane array in the air for FSTV that is working out well - you might consider this antenna perhaps for an ON-CARRIER AUDIO transmit antenna for your repeater system. ON-CARRIER AUDIO continues to be one of the most mis-understood facets of the UHF HAM-TV signal (due to lack of proper manufacturer support) and yet, once installed into an ATV receive and transmit system - it absolutely amazes everyone who comes into contact with it. You'll wonder how you got along without it. ON-CARRIER AUDIO is standard on all WYMAN and T.D. SYSTEMS FSTV equipment and a number of repeaters now feature this additional audio send/receive method. The future of ON-CARRIER AUDIO looks interesting as an effective means of "cleaning up the 70 CM band" (if the 4.5 MHz. subcarrier is turned off) and reducing QRM complaints with our encroaching FM neighbors (another upcoming article is planned on this later).

I'd like to hear from any of you out there in HAM-TV land who do go and build up this array. The sharing of learned information is what the guys up in Dubuque and this journal is all about. Lets get some of these arrays measured at Dayton next year to give those "VERTICAL FOREVER" patriots something else to talk about... 73's -WB5KGL



4-Bay 4 DBd  
W-I-R-E  
UHF Horizontally  
Polarized  
Omni-directional

# ZIG-ZAG Antenna for HAM-TV by WBSKGL

4-BAY WIRE  
ARRAY

8-bay 7 DBd  
optional

In Use at  
MATS ATV  
Group  
Maquoketa,  
Iowa

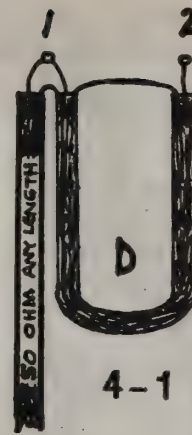
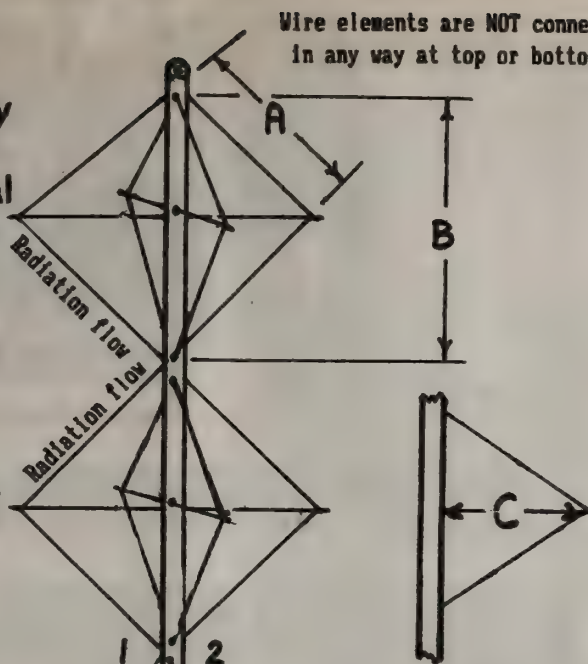
Dimension A is 1/2 wavelength in inches per side. All sides are equal 1/2 wavelengths. Current flow moves up & down all elements. Cancellation nulls vertical radiation. Dimension B is the distance between the top & bottom of elements. Dimension C is the distance out from the mastpipe. Dimension D is the U-shaped balun from ends of center conductors. Dimension E is the length of wire interface connectors.

Drawn by  
WBØQCD

BASED ON GERMAN  
& BRITISH DESIGNS

SPEC-COM Journal  
NOV/DEC '90

Wire elements are NOT connected  
in any way at top or bottom!



Feedpoint 1 goes to  
one side of bay  
array and Feedpoint  
2 to the other at  
center of total  
array. Interface  
wire connectors.

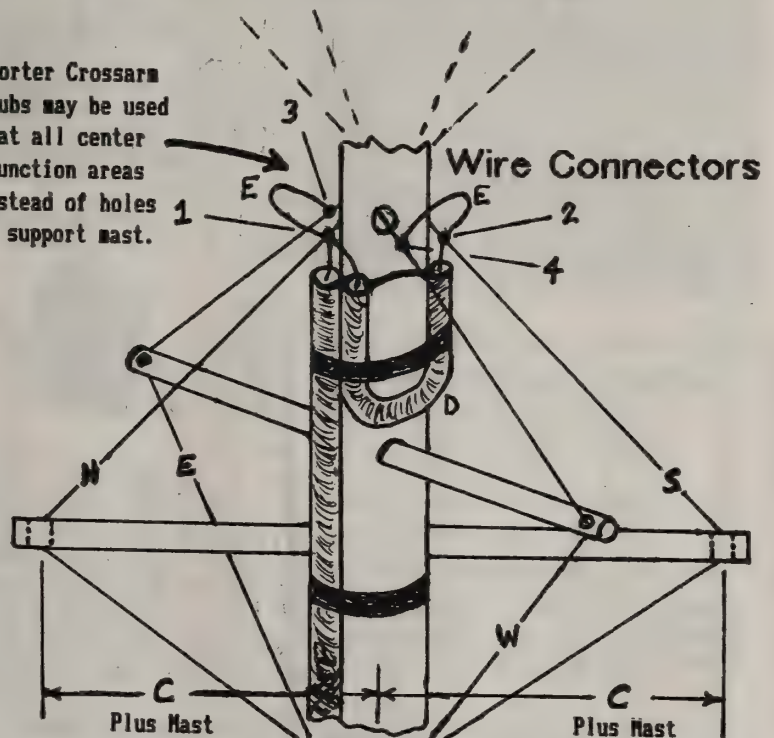
RG58U 66% vf.

Teflon 141 69% vf.

## 4-1 MATCHING BALUN

Solder "hot" coaxial center conductors  
to left/right elements of one bay. Use  
wire jumpers (E) to interconnect other  
90 degree phased bay. Solder all  
common ground shields together.

Shorter Crossarm  
stubs may be used  
at all center  
junction areas  
instead of holes  
in support mast.



### WIRE ELEMENTS FREQUENCY DIMENSION TABLE

Use #14 or #16 guage (or thicker) "coated" copper wire.  
Solder connection points & weatherize any exposed parts.

	A	B	C	D	E
430 MHz.	13.5	19.4	9.7	9.0	6.66
920 MHz.	6.3	8.9	4.45	4.23	3.0
1250 MHz.	4.7	6.64	3.32	3.1	2.3

Dimension given in inches. Based on 97% velocity factor.

Mast pipe can be of  
1-2" Fibreglass or  
PVC construction.  
Cross support tubing  
1/2 inch stock.  
Glue tube into mast  
insertion areas.

Glued and  
Threaded Coupler



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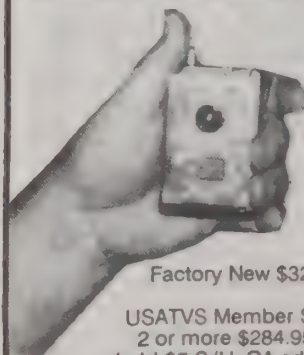
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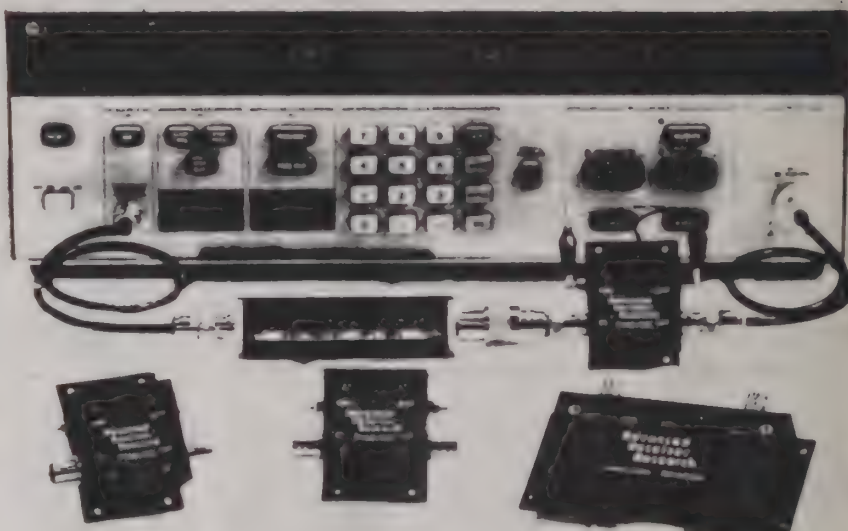


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P50VD	50-54	<1.3	15	0	DGFET	\$29.95
P50VDG	50-54	<0.5	24	+12	GaAsFET	\$79.95
P144VD	144-148	<1.5	15	0	DGFET	\$29.95
P144VDA	144-148	<1.0	15	0	DGFET	\$37.95
P144VDG	144-148	<0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	<1.8	15	0	DGFET	\$29.95
P220VDA	220-225	<1.2	15	0	DGFET	\$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	\$79.95
P432VD	420-450	<1.8	15	-20	Bipolar	\$32.95
P432VDA	420-450	<1.1	17	-20	Bipolar	\$49.95
P432VDG	420-450	<0.5	16	+12	GaAsFET	\$79.95
Inline (rt switched)						
SP28VD	28-30	<1.2	15	0	DGFET	\$59.95
SP50VD	50-54	<1.4	15	0	DGFET	\$59.95
SP50VDG	50-54	<0.55	24	+12	GaAsFET	\$109.95
SP144VD	144-148	<1.6	15	0	DGFET	\$67.95
SP144VDA	144-148	<1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	\$109.95
SP220VD	220-225	<1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	\$109.95
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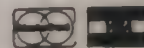
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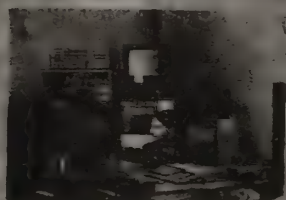
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Goldrush of the Airwaves  
Introduction by Harry Tootle



## LOW-POWER TELEVISION (LPTV) with Harry Tootle WB7PVO



WB7PVO at K33DG UHF-TV Channel 33, Tulsa, Oklahoma

Hi gang! Some skeptical dis-believers doubt all that I have been saying about how easy it is for just one single person to get in on THE GOLDRUSH TO THE AIRWAVES and getting a CONSTRUCTION PERMIT for your very own commercial LOW-POWER TV station from the FCC. Well skeptics, check this out: TOOTLEVISION BROADCASTING INC. 24 HOUR TELEVISION & SATELLITE NETWORK: K04NZ (Stereo) Tulsa, OK., KI9CJ (Stereo) Muskogee, OK., K33DG (Stereo) Tulsa, OK., K21CS (Stereo) Tahlequah, OK. and just recently acquired: K19CS in Las Vegas, NV. Yes, I said Channel 19 in LAS VEGAS, NEVADA!!!

When I say "easy" I mean it is easy NOW, since I struggled through all the bureaucratic mess of required paperwork to learn what all was needed to file the complicated paperwork. With my book, I have done a lot of that tedious work for you! Just a couple years ago, I could not have imagined in my wildest dreams that I would own the rights to a TV station in the gambling capital of the world - a place where nearly all the customers are "up" all-night long. Think of the possibilities! This dream can become a reality for YOU if you have the guts enough to try for it in your area...

The FCC changed their minds this year about having 2 filing windows in 1990. Instead of the first filing window which was to be held in June 1990, they held a National Lottery. There were applications dating back as far as 1981 which have now been "cleared off the board". We have been

told to look for the (first) filing window this year to be held this fall. Last year however, they said "this fall" - the window actually opened December 4th through December 8th. If you are considering making an official application, you had better get in touch with me pronto!

In addition, the FCC has a new FORM #155 (FEE PROCESSING FORM) which must accompany new LPTV applications. For those of you who have your completed applications, I will be sending you the additional forms to attach to your existing application package. The FCC filing fee has now been increased to \$425.00.

Several of you have been patiently waiting for your processing, and I want to assure you that I have NOT forgotten you. Three or four of you have requested sites in or near major (congested) areas, and no channels were currently available at the time we did your channel search. By letting a few months pass, we hope that a Construction Permit (or two...) will expire and then we can proceed. If you prefer to try another location (at no charge), please feel free to call me at your earliest convenience.

We have upgraded the GOLD RUSH package. The book, now entitled, "GOLD RUSH TO THE AIRWAVES II", has been increased to nearly 250 pages and it now comes with TWO audio cassettes. The book now has more technical and engineering information included as well as a sample RATE CARD, TV MARKET ANALYSIS, TIPS ON SELECTING YOUR



**PROPOSED SITE**, etc. The new package now sells for \$100 (postage paid) and is now available. Current Engineering costs are \$1245.00 for preliminary engineering and full channel search and then \$1750.00 for application preparation fee (first channel). Additional preparation fees are \$750.00/channel (same site/same time). We now offer our **EXCLUSIVE TOOTLEVISION GUARANTEE** which means, that if we are unable to find you a "clear channel" at your first chosen community, we perform an additional full channel search at a 2nd location of your choice, **AT NO ADDITIONAL COST!** You see, **WE REALLY WANT YOU ON-THE-AIR!**

Finally, The Community Broadcaster's Association will hold its' annual CBA Convention at the Riviera Hotel, Las Vegas on November 17, 18 and 19th. We will be there and will unveil our new LPTV **PRODUCT LINE** of antenna and other LPTV station equipment. For more information about the convention or Hotel accommodations, contact Suzanne Dooling at (414) 781-0188 (be sure to mention TOOTLEVISION).

Well gang, that is about it from here for this column. I'll see some of you at Las Vegas and the rest of you next year at the **SPEC-COM DAYTON ATV WORKSHOP** sessions!

-73's Harry WB7PVO

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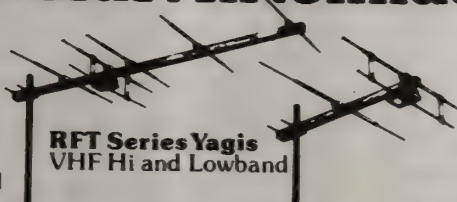
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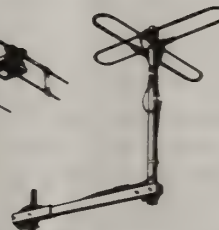
## LPTV Commercial Antennas



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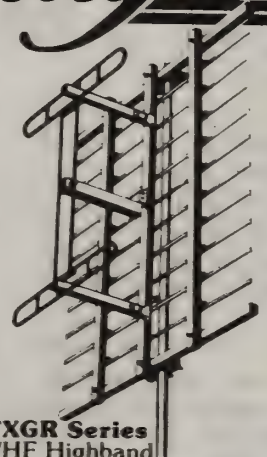
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# FACSIMILE & SLOW-SCAN TV IMAGING

by Fred Sharp W8ASF - 4676 Hamlets Grove Drive, Sarasota, FL 34235



**Columnist Fred Sharp W8ASF**

Dear readers. My move to Florida is now complete. All my Amateur and Satellite equipment has been installed, checked and found to be in good working order. My one blockbuster problem is that I live in a deed restricted area. For those who don't know what this is, things like outside antennas are a no-no, consequently, my back yard holds an aluminum tree that doubles as a Cushcraft 10-15-20 meter vertical. I planted 20 radials and I'm very happy with it. It's only 14 ft tall and sitting right next to a tall pine tree, with it's own Spanish Moss, it really is undetectable. I've gotten S-6/8 reports on SSTV from Italy and Australia. Certainly one has to put up with the non-directivity of a vertical, but C'est La Vie.

Satellite antennas are not a headache. I have a quadrifiler helix for 137 MHZ polar orbiters. It's mounted in the attic, pointing straight up, maybe 12 feet above the ground and my pictures are superb. There is, of course a preamp at the antenna, but that is always good practice. I'm seeing the birds from one horizon to the other. The dish antenna for GOES has not been installed as yet. It's 4.5 ft in diameter and too large to squeak up thru a little trap door leading to the attic. I've been searching for smaller dishes that would make it through the small opening but just discovered that I had a perfect hiding place for it outside, sort of buried in a bunch of palmetto palms at the base of a giant pine tree in my yard. So much for the "home front".

There is much happening in polar orbiters. For instance, the Republic of China has launched a successful replacement for their Fen Yun, which is called Fen Yun 1B. It went up on September 3rd and is sending APT and HRPT data in much the same format as the NOAA birds. It's in a sun synchronous orbit and is transmitting on 137.795 MHZ.

A new satellite was heard by Mr P.A. Zagoy of Portland Oregon. It's sending 240 line pictures on 137.275 MHZ. I heard it once and my tracking programs tell me that this bird is the reactivated Soviet Kosmos 1602. (Cosmos is the Americanized spelling). All Kosmos satellites have the same large number format at the side and are easily identifiable.

According to the news agency Tass, there has been another Meteor 2 series launched on September 28th. The orbital period is 104.2 minutes and the inclination is 82.5 degrees. No signals have been received as of this writing. Of the 6 or so Soviet polar orbiters, only 2, Met 2-18 and Met 3-2 are the only ones being heard now and occasionally Okean-2 on 137.4 with 240 lpm

In the American satellites, NOAA 9 is still operational along with NOAA 10 and 11. I don't know about any plans for the launch of another satellite of this class but we expect to launch GOES-NEXT next year. The best GOES to watch now is GOES WEST, located at 135.8 degrees West with an inclination angle of 2.4 degrees. This satellite supports WEFAX. GOES 7 (PRIME) is operational at 97.3 degrees west. GOES 5 has finally been deactivated, GOES 3 is on standby at 176.0 degrees west along with GOES 2 at 60.0 degrees West.



A Publication  
for the Radio-Amateur  
Especially Covering VHF  
UHF and Microwaves

## VHF communications

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TimeKit (Fred Sharp W8ASF) wishes to thank everyone for past patronage.

NOAA-D will be launched in May 1991. When it's inserted into orbit it will be NOAA-12. GOES-I launch is estimated at February 1992. As in the past, it will become GOES-8 when inserted in geostationary orbit at 22,300 miles above the earth.

Other geostationary satellites are the European Space Agency Meteosat-4, now having imaging trouble. They are trying to find out what is causing the "fishes" in the image. Meteosat-5 is scheduled for launch by EUMET-SAT in February 1991. GMS-4 (Himawari-4) is a geostationary spin stabilized satellite. (Remember Werner VanBraun and his spin stabilized Satellite on top of the U.S.Army Redstone missile). It consists of a de-spun section and a 100 RPM rotating spin section which contains the Visible and Infrared Spin Scan Radiometer (VISSR). The de-spun section holds the earth oriented antennas. GMS-5 will be launched in mid 1993. Both these birds transmit pictures of Australia, New Zealand, Borneo and Japan, etc.

The NOAA.DRUSER electronic bulletin board has been replaced by the NOAA.SAT EBB on OMNET/SCIENCENET through SprintMail's domestic and International networks. I find the system much, much faster and more user friendly. The access data codes are much simpler. To get the local access phone number for your city call 1-800-546-1000 for 300 to 2400 baud BBS. Dial up your number and at the TERMINAL prompt type D1 (ENTER). At the @ prompt type MAIL (ENTER) at the USER NAME prompt type PHONES, at the PASSWORD prompt type PHONES then just follow directions to get your local number and the access procedure. If you have trouble, drop me a line and I'll send all the data.

## SLOW-SCAN TV

On the SSTV scene there more new things happening. The Scottie 3.6 EPROM for the Robot 1200C and the LM9000 is now a reality. It has the new DX mode which makes reception of almost perfect pictures with an S-3 to 4 input signal. As we all know, you normally have to have an S-9 signal in to get a good noise free picture. Bert Beyt W5ZR reports qso's with Australia that were "picture perfect" at S-3 !! Inasmuch as there are now a "slew" of 1200C EPROM'S on the market (Martin Emerson, Canadian, Scottie, etc, etc) as I understand it, there will be a system for switching between up to six EPROM'S. More on this later.

Bert Beyt W5ZR now has a new IBM ROBOT 1200C/EPROM program available called: SCAN Version 6.01. He only charges \$20.00 for it. I got it and it works great! The latest version supports all known 1200C EPROMS. Contact Bert at 301 Tempico Street, New Ineria, LA. 70560.

Martin Emerson will be out shortly with a new EPROM that will include the AEA AVT modes. Now we'll be able to send pictures to DOO DEE DOO DOO DOO Johann N5CST !



There seem to be many more Russia SSTV stations on the air now. The new rules permitting Soviet hams to receive QSL's direct and to be able to mail them direct to their contact has generated interest in all areas. Perestroika is working in more ways than one.

The 10 meter band is finally starting to take some of the load off of 14.230 and once again on 10, it's nice to hear both sides of a qso if you're just listening. Now if we can only make some headway on 15 and 40 meter SSTV. As the Heavyside layer does it's thing and skip gets better and better I'm sure SSTV will follow suit.

Rumor has it that Don Miller W4NIP (Wyman Research) is working on a new SSTV scan converter. There is a new Japanese board out for the Robot 1200C and LM 9000 that replaces the present analog board at the same time reducing the number of chips by, hold your hats, 60% !! It uses the TDA 3570 or EGC 1416 chip, which includes a lot of video signal conditioning. For further info write to Muneki Yimifuzi JF3GOH, P.O. Box 670, Osaka, Japan 531. W5ZR, T4TGC and Don K8SQL are currently experimenting with it.

Last I heard, Tom Hibben KB9MC is running the Saturday 1500 GMT IVCA net. John Wilson, I understand will be doing some writing for the IVCA newsletter.

Ciao Fred W8ASF

Fred Sharp W8ASF may also be contacted for questions or SSTV/FAX reporting on the E.C. BBS (319) 582-3235 [use 8-N-1 for your modem software] or he may be written to at his new 4676 Hamlets Grove Drive, Sarasota, Florida 34235 address.

From: Mike Donovan KA0JAW  
SPEC-COM Communications & Pub. Group Ltd.

### NOTICE....

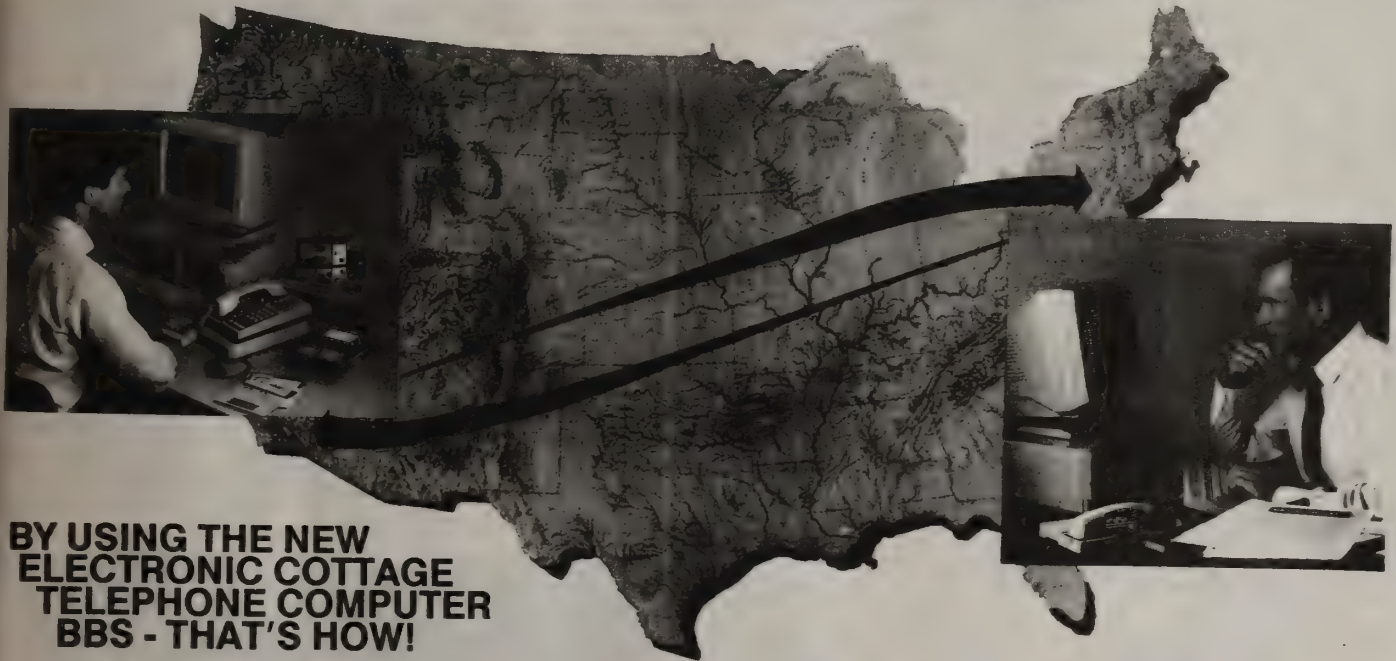
Several of you have been sending orders or requesting information on your order for software sold by Ham Radio Software to me at Spec-Com Communication and Publishing, Inc.

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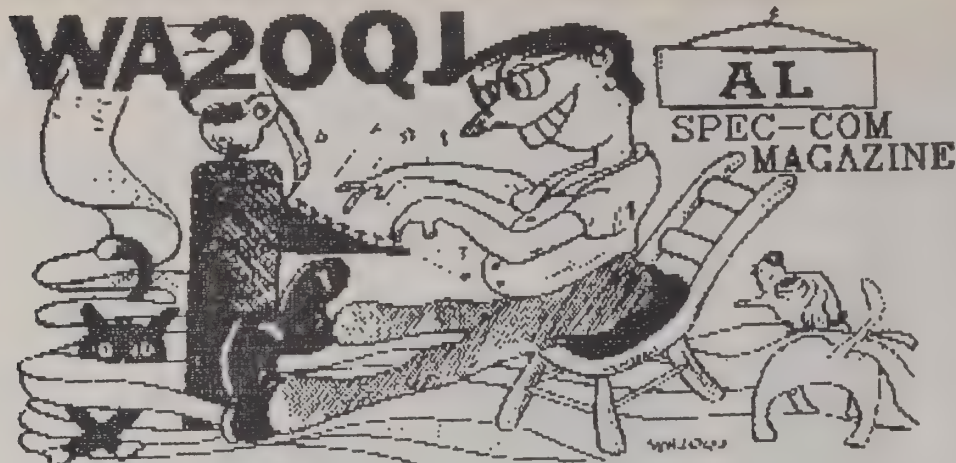
Bill Fay KA0DFI Dubuque Iowa, Mike Stone WB0QCD Clarence Iowa, Mike Donovan KA0JAW Dubuque Iowa, Rose Stone KA0SUT Clarence, Iowa, Dale Lam WA0NKE Kansas City Missouri, David Boyler KA4RVS Oxford North Carolina, Dale Pennino N2JYK New Jersey, Grant Pritchard KK6JJ Novato California, Everett Smith WA0DWG Bloomington Minnesota, Craig Jorgenson WB0OLX Davenport Iowa, Carl Sheldon N0HNV Loveland Colorado, Peter Kallio N7ENT Port Orchard Washington, Bretton Cox KB7TVN Layton Utah, Lyon Hurd WB7UNU Beaverton Oregon, Michael Baker N0GMT Kansas City Kansas, David Hazell KD9RV Batavia Illinois, Ron Hranac N0IVN Denver Colorado, Gene Creamer KB2GZ Belmar New Jersey, Don Knollinger WB8ZTV Moundsville West Virginia, Neil Johnson N4XSD Oxford Florida, Dean Andrewjeski AD9W Wausau Wisconsin, Fred Sharp W8ASF Florida, John K9ORS, Brian Zdan KM0Y and Joe Holman KA7LDN of Redman Washington?

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# "RTTY AUTOSTART" with Al LaVorgna WA2OQJ



[EDITORS COMMENTS] Finding someone dedicated enough to author a regular column on RTTY is difficult these days. We are fortunate to have our Staff Political Graphic Artist and Cartoonist pulling double-duty by heading up our NEW RTTY column! Thanks Al. Many of us started on RTTY years ago, some on VHF and others on HF (or both). Interest seemed to really fall off when PACKET came about and many abandon RTTY for the AX.25 data mode. PACKET is okay, but with the congestion of Bulletin Boards and lack of "live on-the-air, one on one QSO's" - many miss the enjoyment of keying up and typing away with a fulfilled exchange of conversation. Quite a few seem to be coming back to RTTY. They still maintain their PACKET equipment and contacts but they seem to yearn for the FUN of the good ole' RTTY days, of AUTOSTART and paper all over the floor. We see a resurgence of RTTY coming and we want to help it along. It can't happen none to soon... -WBOQCD

FROM WA2OQJ

It is my intention to keep this column on the light side and leave the technical jargon for the experts. There may be some circuits or equipment reviews now and then, but most RTTY enthusiasts are more interested in what is going on within the bands. If you have an interesting RTTY related stories or information from your neck of the woods, please send it to me. The address is listed above.

For the old time RTTY operators, we will add some nostalgia about the good ole days with older mechanical machines and reminisce with memories of the old Model 14's, 15's and 16's, the Kleinschmidts and the majestic and revered Model 28 ASR by Teletype (tm). All the memories of all that noise and smell. I remember the day I left my 28 on AUTOSTART while away for the day. When I arrived back home, I had paper three feet deep in the shack. I think a playful ham in the area was testing carriage returns for hours (he wouldn't have done it on purpose now would he?).

Being a great enthusiast of RTTY pictures (RTTY PIX) or sometimes referred to as RTTY ART, I have had my share of awards down through the years. Mt taped collection of RTTY PIX numbers well over 600! It would be nice to publish some of these treasures - both YOURS and MINE here in

the pages of our USATVS Journal. Pictures must be in printed form and not tape. Reduce them (copy machine) to the size shown on page 59 (or less) so that Mike can paste them up in the magazine. Occasionally, I will run over to my friend WA2OQO who has a mint condition 28 and refuses to join the demodulator crowd, to get one of my old tapes printed. I know that many of you have kept your chad or chadless tapes or converted them to audio tape. Blow the dust off of them and send me a few - and lets get them published. Perhaps in a future issue, I will go into detail on how I made up these picture tapes out of magazines. It is truly an "ART" for those of us who enjoyed originating them. Pictured on page 59 is my 2nd place winner in the 1981 SCATS RTTY ART CONTEST. It is entitled; "A PRIZE IN EVERY BOX".

I must admit that I like the other modes of communication such as phone, slow-scan TV and a bit of CW now and then (10 wpm). Then my monitor scope looks at me with its blank tube and I switch over to RTTY to tune in those beautiful goose eggs. I tried tuning in stations with my old MICROLOG demodulator but never could get the hang of those blinking neons. Presently my gear here in the Ham Shack consists of an AEA PK-232 and AEA software for my Commodore 64 computer. The antenna is an R5 vertical that performs very well. My beam has a burned

**WA2OQJ at  
his SSTV  
and RTTY  
station  
in  
Hicksville  
New York**



Write to Al LaVorgna c/o 21 Kuhl Avenue, Hicksville, NY 1180







## THE MULTIFAX/PRECISION TEAM!

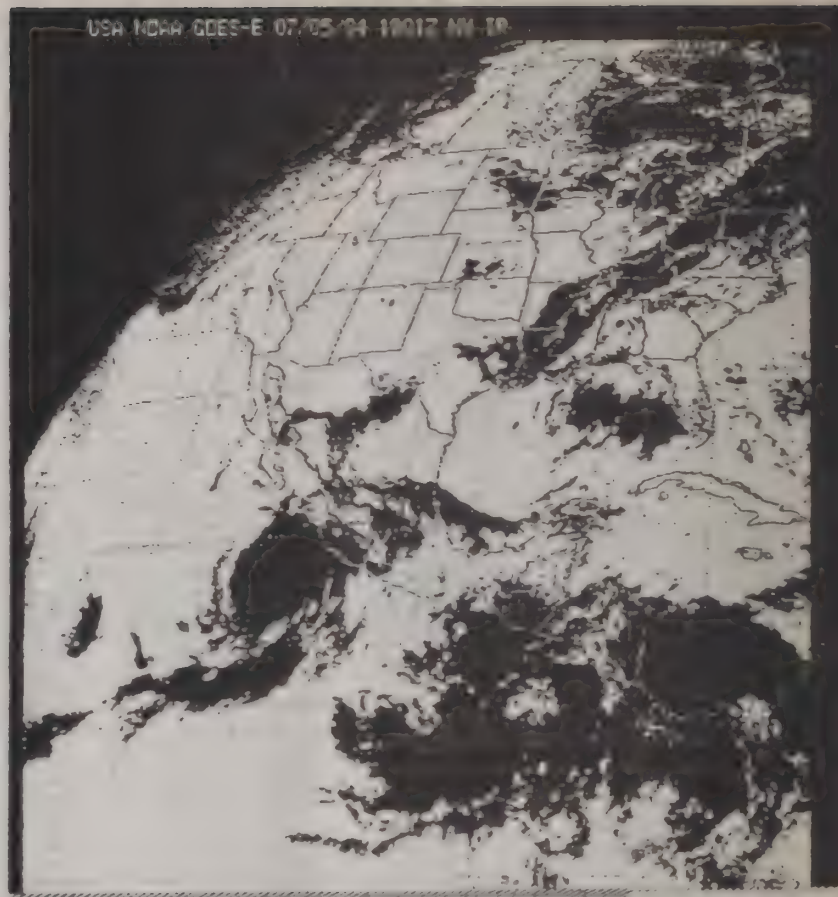
by Mike Donovan KA0JAW

Like many of you, I have been fascinated by high-quality WEFAX Global and Weather Map photos. So much so, that I am currently assembling my own EARTH WEFAX RECEIVE STATION here in Dubuque including a 386 series high-speed IBM (clone) computer, facsimile signal demodulator (and software) and a high-gain directional dish antenna. I plan on feeding these incoming pictures from VHF into my Fast Scan TV transmitter and antenna system to relay "live" pictures into our nearby M.A.T.S. ATV Repeater & Remote Transmitter System down in Maquoketa, Iowa.

Finding a dish to erect, interfacing a receiver and the gearing up the computer are the easy parts of the project. Selecting the right, affordable WEFAX IMAGE software AND interface is a critically important decision that MUST NOT be overlooked lightly.

Past issues of SPEC-COM have covered several types of commercial WEFAX software package reviews and descriptions. I'd like to share with you, the package that I chose to go with based largely on the reputation of the designers. I am talking about ELMER and DAVID SCHWITTEK's new "MULTIFAX" software releases, their PRECISION model interface and A & A ENGINEERING's own "kit" or assembled no-frill demodulator.

Remember the large front cover HURRICANE HUGO WEFAX global photo that we featured on the front cover of an issue a few months ago (JUL/AUG '90)? That was received from the NOAA 11 satellite in space using MULTIFAX version 4.0 WEFAX, a PRECISION demodulator interface and an IBM compatible computer. I have ordered the new 5.0 version software update from David Schwitek in New York for my VGA system which allows HARD DRIVE/RAM installation and control.



On-disk, MULTIFAX provided NOAA GOES image low-res. picture

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Price \$49 for either program (\$20 for previous MF buyers), post paid in US, Canada, & Mexico. Add \$3 for airmail elsewhere. No credit cards.

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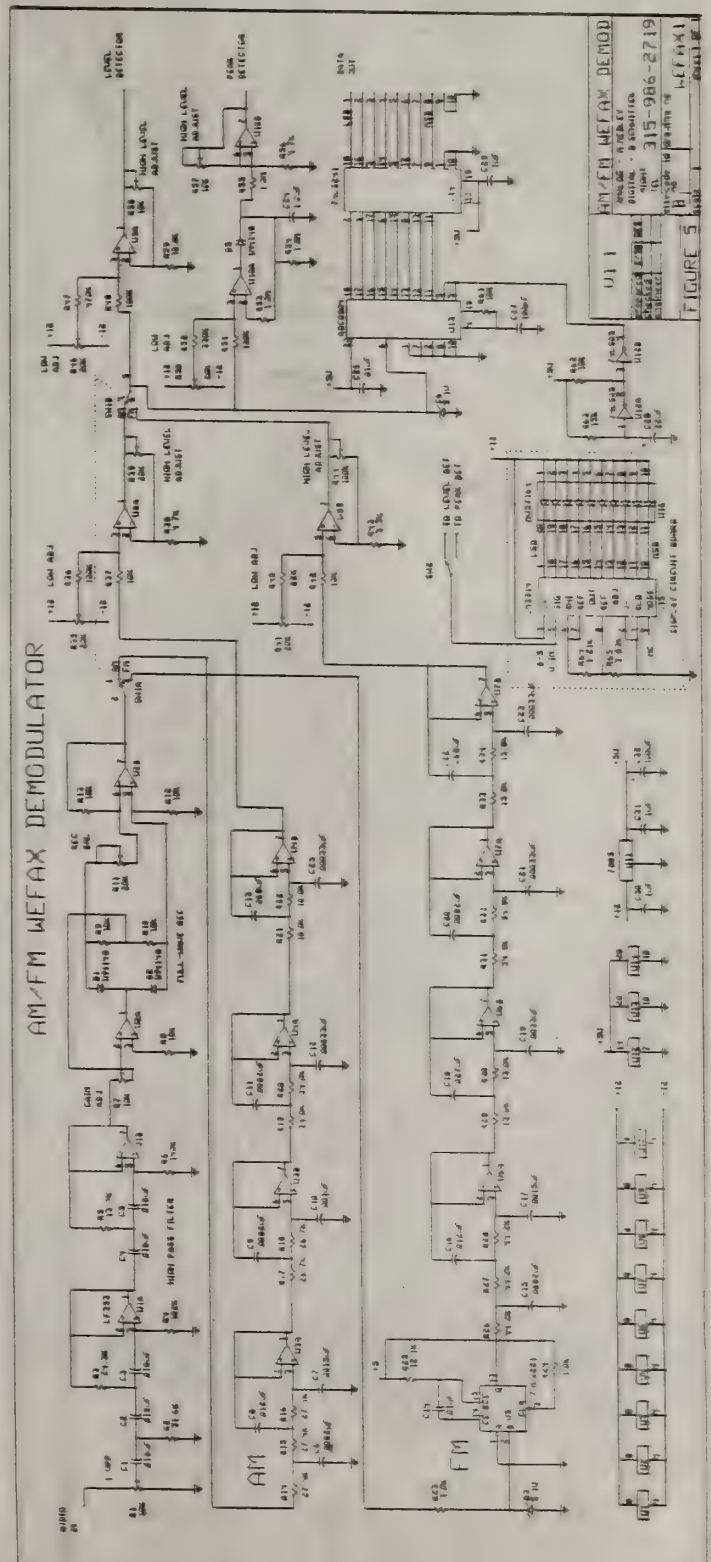
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# "SPACE TALK" OSCAR & NASA News Column

with Joe Holman KA7LDN

P.O. Box 37, Redman, Washington 98073

**CQ CQ CQ, calling CQ SATELLITE de KA7LDN.** That is one of my most favorite things to do - that is, calling CQ for another exciting QSO on one of the many amateur radio satellites orbiting the earth! As you can tell, I'm very enthused about satellites, and I'm very excited about becoming the bi-monthly columnist for SPEC-COM's new "SPACE TALK" satellite column! SPEC-COM has always tried to present some Satellite articles and news from time to time in the past, but now, they have hired me to keep you all informed each issue on a regular reporting basis. This additional column really rounds out SPEC-COM's intended full-coverage of ALL specialized modes nicely.

This is my first article in this magazine, so let me take the opportunity to introduce myself. **My name and call is Joe Holman, KA7LDN.** I have been a licensed HAM since 1982, and currently hold the position of AMSAT Northwest Regional Coordinator for Washington, Idaho, Oregon, and Montana. About three or four times a week, you can find me on either AO-13 or FO-20 in the evening - I am quite active on the birds, working both DX and state-side contacts. Well, enough about me, let's talk more about Orbiting Satellites Carrying Amateur Radio (OSCARs). Since many of you (on FSTV) are already experienced in UHF operations, know about the importance of low-loss cable, mast-mounted preamplifiers and gear that covers the 70 cm. and above bands - you are ideal candidates to ease your way into additionally working OSCAR and other Amateur satellites!

Currently, there are quite a few flavors of satellites orbiting the Earth. You can find satellites operating on quite a large spectrum of amateur radio frequencies. Below, I'll list a few of the current bands, and satellites which operate on them:

Band	Satellite
10m	RS-10/11
2m	AO-10, AO-13, FO-20, DOVE, RS-10
70cm	AO-10, AO-13, FO-20, PACSATS, WEBERSAT
23cm	AO-13

As you can see, whether you are interested in HF, VHF, or UHF, you can find at least one satellite to operate with your current equipment. Some of you by now are probably asking, "Well, I'm interested, but, how do I know when the satellite is near my QTH?" That's a good question, and probably the most often asked. The best and easiest way to predict when a particular satellite is in your area is by using a satellite tracking program. This software allows you to determine when and where any satellite is located, at any time. Most prediction software is written to run on the IBM PC (and compatibles), Radio Shack TRS80 Color Computer, Commodore, and Apple Macintosh computers. The Amateur Radio Satellite Corporation (AMSAT-NA) provides many well-written programs just for this purpose.

I also encourage you to join AMSAT, all proceeds are used to build better satellites, and you get a subscription of the Satellite Journal which contains many technical articles about the OSCARs. Next time, I will discuss in more detail the specific band plans for AO-13, and the antenna and equipment required to make your first satellite QSO. Forthcoming information in this column will include helpful hints that you will need to know in order to operate different OSCARs.

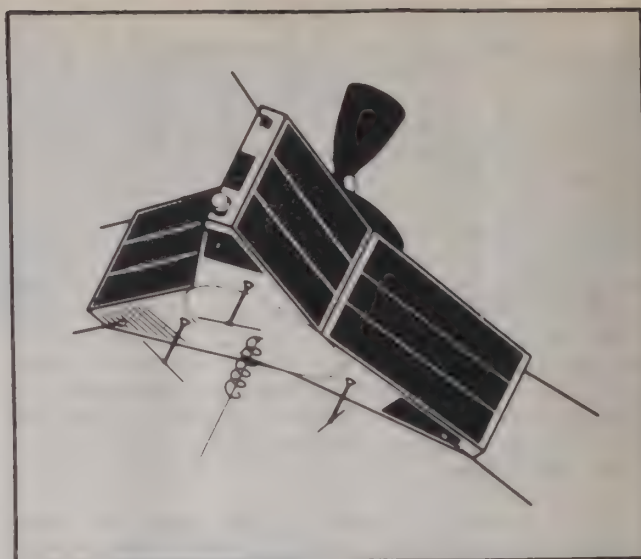
## Current Satellite Notes:

**AO-10** is currently not receiving sufficient solar illumination for proper operation. Please do not use AO-10 until at least November, 1990. AO-13 currently operates under the following transponder schedule:

Operating Mode		
Phase B	003 - 165	
JL	165 - 195	
B	195 - 240	
OFF	240 - 003 (Mode B Beacon On)	

**FO-20** is still operating under limited conditions. The satellite is not encountering any solar eclipses which cool the bird's hot internal temperatures. Until further notice, FO-20 will operate as stated below:

UTC To UTC	Operating Mode
01 Oct 90 0900	
02 Oct 90 0910	PSK Telemetry acquisition
04 Oct 90 0955	
04 Oct 90 2330	JA
08 Oct 90 0920	
08 Oct 90 1110	JA and JD
11 Oct 90 0825	
12 Oct 90 0850	JD



AMSAT PHASE 3

11 Oct 90 0825

12 Oct 90 0850 JD

**MIR Space Station To Fly With HAM RADIO gear again.** In January, 1991, an Austrian cosmonaut will be joining the MIR crew. This new crew member will bring 2m packet and voice amateur radio equipment to the space station. The equipment provides an opportunity to capture standard AX.25 TNC telemetry, and to listen to digitized voice messages spoken in German, Russian, and English. Later in the year, Bulletin Board System (BBS) software will be installed to directly connect to the on-board TNC system. Stay tuned to this column for further details.

Here are some recent **Keplerian elements** to enter into your favorite satellite tracking program:

Satellite: AO-10  
Catalog number: 14129  
Epoch time: 90260.93187818  
Element set: 549  
Inclination: 26.0092 deg  
RA of node: 184.3937 deg  
Eccentricity: 0.5954699  
Arg of perigee: 176.6918 deg  
Mean anomaly: 190.5773 deg  
Mean motion: 2.05881694 rev/day  
Decay rate: -5.80e-07 rev/day@2  
Epoch rev: 5464

Satellite: UO-11  
Catalog number: 14781  
Epoch time: 90268.04142506  
Element set: 786  
Inclination: 97.9423 deg  
RA of node: 317.2989 deg  
Eccentricity: 0.0011803  
Arg of perigee: 293.7999 deg  
Mean anomaly: 66.1969 deg  
Mean motion: 14.65706130 rev/day  
Decay rate: 2.098e-05 rev/day@2  
Epoch rev: 35059

Satellite: RS-10/11  
Catalog number: 18129  
Epoch time: 90267.77847824  
Element set: 332  
Inclination: 82.9217 deg  
RA of node: 254.9370 deg  
Eccentricity: 0.0011340  
Arg of perigee: 195.4973 deg  
Mean anomaly: 164.5823 deg  
Mean motion: 13.72110926 rev/day  
Decay rate: 1.70e-07 rev/day@2  
Epoch rev: 16310

Satellite: AO-13  
Catalog number: 19216  
Epoch time: 90263.62168524  
Element set: 146  
Inclination: 56.8713 deg  
RA of node: 134.9262 deg  
Eccentricity: 0.7029521  
Arg of perigee: 236.1311 deg  
Mean anomaly: 37.1395 deg  
Mean motion: 2.09702232 rev/day  
Decay rate: -1.20e-06 rev/day@2  
Epoch rev: 1740



Satellite: FO-20  
 Catalog number: 20480  
 Epoch time: 90261.57386249  
 Element set: 104  
 Inclination: 99.0356 deg  
 RA of node: 290.4267 deg  
 Eccentricity: 0.0540429  
 Arg of perigee: 196.9758 deg  
 Mean anomaly: 161.2629 deg  
 Mean motion: 12.83160374 rev/day  
 Decay rate: 1.10e-07 rev/day<sup>02</sup>  
 Epoch rev: 2872

Satellite: UO-14  
 Catalog number: 20437  
 Epoch time: 90266.22484339  
 Element set: 208  
 Inclination: 98.6921 deg  
 RA of node: 342.0182 deg  
 Eccentricity: 0.0010529  
 Arg of perigee: 229.3009 deg  
 Mean anomaly: 130.7273 deg  
 Mean motion: 14.28724065 rev/day  
 Decay rate: 6.90e-06 rev/day<sup>02</sup>  
 Epoch rev: 3486

Satellite: AO-16  
 Catalog number: 20439  
 Epoch time: 90265.36721578  
 Element set: 110  
 Inclination: 98.6987 deg  
 RA of node: 341.3263 deg  
 Eccentricity: 0.0010630  
 Arg of perigee: 229.8888 deg  
 Mean anomaly: 130.1393 deg  
 Mean motion: 14.28824015 rev/day  
 Decay rate: 6.24e-06 rev/day<sup>02</sup>  
 Epoch rev: 3474

Satellite: DO-17  
 Catalog number: 20440  
 Epoch time: 90266.41038971  
 Element set: 120  
 Inclination: 98.6978 deg  
 RA of node: 342.3824 deg  
 Eccentricity: 0.0010896  
 Arg of perigee: 225.7236 deg  
 Mean anomaly: 134.3066 deg  
 Mean motion: 14.28878142 rev/day  
 Decay rate: 7.25e-06 rev/day<sup>02</sup>  
 Epoch rev: 3489

Satellite: WO-18  
 Catalog number: 20441  
 Epoch time: 90266.11300440  
 Element set: 113  
 Inclination: 98.6989 deg  
 RA of node: 342.1183 deg  
 Eccentricity: 0.0011375  
 Arg of perigee: 227.5911 deg  
 Mean anomaly: 132.4315 deg  
 Mean motion: 14.28965575 rev/day  
 Decay rate: 6.05e-06 rev/day<sup>02</sup>  
 Epoch rev: 3485

Satellite: LO-19  
 Catalog number: 20442  
 Epoch time: 90267.43158664  
 Element set: 116  
 Inclination: 98.6984 deg  
 RA of node: 343.4593 deg  
 Eccentricity: 0.0011784  
 Arg of perigee: 222.9453 deg  
 Mean anomaly: 137.0809 deg  
 Mean motion: 14.29038750 rev/day  
 Decay rate: 6.55e-06 rev/day<sup>02</sup>  
 Epoch rev: 3504

Satellite: MIR  
 Catalog number: 16609  
 Epoch time: 90267.82606835  
 Element set: 952  
 Inclination: 51.6115 deg  
 RA of node: 187.8282 deg  
 Eccentricity: 0.0026528  
 Arg of perigee: 82.5778 deg  
 Mean anomaly: 277.8169 deg  
 Mean motion: 15.59246468 rev/day  
 Decay rate: 2.6386e-04 rev/day<sup>02</sup>  
 Epoch rev: 26367

Satellite: HUBBLE  
 Catalog number: 20580  
 Epoch time: 90267.52216337  
 Element set: 222  
 Inclination: 28.4722 deg  
 RA of node: 337.3966 deg  
 Eccentricity: 0.0005673  
 Arg of perigee: 89.3180 deg  
 Mean anomaly: 270.8068 deg  
 Mean motion: 14.85086020 rev/day  
 Decay rate: 5.959e-05 rev/day<sup>02</sup>  
 Epoch rev: 2275

Satellite: BADR-1  
 Catalog number: 20685  
 Epoch time: 90267.83173221  
 Element set: 88  
 Inclination: 28.4881 deg  
 RA of node: 196.0972 deg  
 Eccentricity: 0.0418544  
 Arg of perigee: 169.4149 deg  
 Mean anomaly: 191.4885 deg  
 Mean motion: 15.27043635 rev/day  
 Decay rate: 3.6595e-03 rev/day<sup>02</sup>  
 Epoch rev: 1069

Satellite: NOAA-9  
 Catalog number: 15427  
 Epoch time: 90262.04297155  
 Element set: 624  
 Inclination: 99.1736 deg  
 RA of node: 264.0809 deg  
 Eccentricity: 0.0016121  
 Arg of perigee: 104.9778 deg  
 Mean anomaly: 255.3181 deg  
 Mean motion: 14.12670897 rev/day  
 Decay rate: 6.03e-06 rev/day<sup>02</sup>  
 Epoch rev: 29723

Satellite: NOAA-10  
 Catalog number: 16969  
 Epoch time: 90267.08976277  
 Element set: 470  
 Inclination: 98.5957 deg  
 RA of node: 292.8029 deg  
 Eccentricity: 0.0013680  
 Arg of perigee: 347.3613 deg  
 Mean anomaly: 12.7225 deg  
 Mean motion: 14.23738001 rev/day  
 Decay rate: 6.20e-06 rev/day<sup>02</sup>  
 Epoch rev: 20868

Satellite: MET-2/17  
 Catalog number: 18820  
 Epoch time: 90266.78156016  
 Element set: 358  
 Inclination: 82.5410 deg  
 RA of node: 272.0805 deg  
 Eccentricity: 0.0018272  
 Arg of perigee: 49.9014 deg  
 Mean anomaly: 310.3744 deg  
 Mean motion: 13.84372296 rev/day  
 Decay rate: 1.17e-06 rev/day<sup>02</sup>  
 Epoch rev: 13382

Satellite: MET-3/2  
 Catalog number: 19336  
 Epoch time: 90266.80742618  
 Element set: 586  
 Inclination: 82.5406 deg  
 RA of node: 207.6393 deg  
 Eccentricity: 0.0019680  
 Arg of perigee: 66.7000 deg  
 Mean anomaly: 293.6121 deg  
 Mean motion: 13.16904777 rev/day  
 Decay rate: 3.92e-06 rev/day<sup>02</sup>  
 Epoch rev: 10393

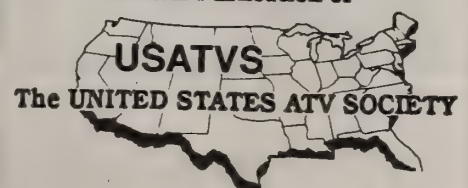
Satellite: NOAA-11  
 Catalog number: 19531  
 Epoch time: 90267.32479912  
 Element set: 350  
 Inclination: 98.9932 deg  
 RA of node: 215.7884 deg  
 Eccentricity: 0.0013079  
 Arg of perigee: 10.2958 deg  
 Mean anomaly: 349.8477 deg  
 Mean motion: 14.11726718 rev/day  
 Decay rate: 1.116e-05 rev/day<sup>02</sup>  
 Epoch rev: 10295

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Complete Satellite KEPLERIAN DATA information is stored on the EC BBS (GG.ASC text file).

CU on the birds and/or the next column gang, and 73 de KA7LDN.

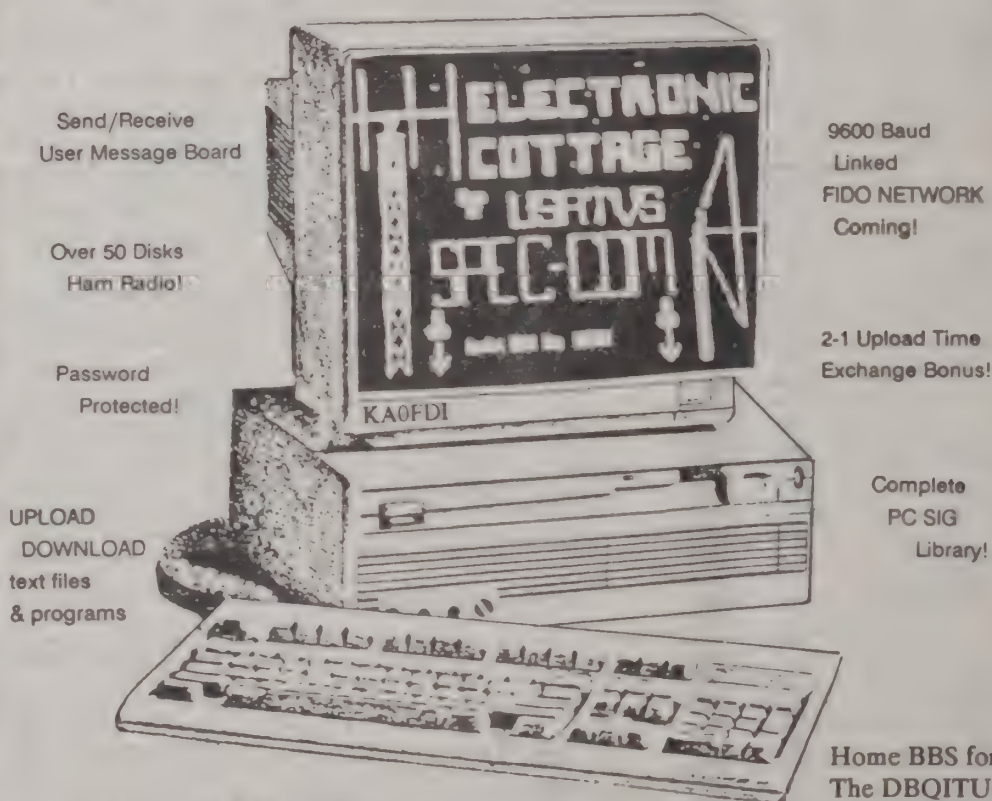
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Total Issues Published: 6 Total Number of Pages: 344 Total Number of Articles: 222 Total Ads Avg.: 31 Adv./Art. Ratio Avg.: 32%

**JANUARY/FEBRUARY 1990 - VOL. 20 NO.1:** (Green) 48 pages; Publishers Statement, From JAWS JAW (Editorial Comments), Latest News, Congressman Tom Tauke Letter on No Fee Licensing, New Products, Review of new AEA FSTV-430 FSTV Transceiver, Television Noise (Unwanted Information) by WB0QCD, Review of the RCA Pro-Wonder Camcorder-AH2AR/8, Poor Mountain Blue Ridge Video Sent (Society), Closed-Circuit Balloon Pictures at W9ZIH QTH, AAAS Club Porta-Peepie by K7AWI, Understanding DX by T.K. McVey, Tooting Our Own Horn (USATVS Accomplishments), ARRL RC Newsletter Confused About ATV/FM QRM, USATVS Videotape Library Listings, Looking Back (Nipkow Disc) with W1BHD, Early Mechanical TV Book Released by K0IWX, Ole Timers Club Announced, Satellite, Facsimile and SSTV with W8ASF, ON-THE-AIR Cartoon #15 (Woodpecker) by WA2OQJ, Packet Racket Column with KA0JAW, New AEA PK-232MBX BBS Mod Available, International Facsimile Broadcast Stations Listing (Software Systems Consulting), Introduction of JAS-1b-JARL & QEX, WA4SIR STS-35 update, Classified Ads. Number of Industry Advertising Supporters: 24.

**MARCH/APRIL 1990 - VOL. 20 NO.2:** (Purple) Color Computer Special Issue 48 pages; Publishers Statement, From JAWS JAW (Editorial Comments), Letters to the Editor, Latest News, USATVS Dayton Ramada Conference Lineup, USATVS State Section Manager FSTV Activity Reports, Proposed PICAP TV Signal Reporting Method, German 28 element 19 dbd gain Yagi Antenna Project, RF Concepts Amps Now Modified for ATV, New Low-Power TV Column Begins by Harry Tootle WB7PVO, Hawkeye TV Transmitter - 2nd Look, Looking Back at Early TV & Radio, 1950 QST Ham-TV Dream Article (Future-ham by W9YMZ), Visual Communications in Japan with JG1DDT, Japanese FTV-140a FM-FSTV Rig Schematic, Slow-Scan TV & FAX in Japan, Satellites, FAX and Slow-Scan TV with W8ASF, Commodore 64 TMH400-64 SSTV Interface by KB9MC, 36 Second ROBOT 400 Mod by W19P and W4CVS, Amiga/AEA AVT Secrets Revealed by WB2OSZ, SSTV From England on 50 Mhz.-G4JJE first, Japan/USATVS 1990 SSTV Contest, Distributed Capacity Coaxial Dipole 80-10 Meters Project, TRS-80 Color Computer ATV Bulletin Board, Large 3D Message Generator software program, Teaching the Young CW Morse Code on Your COCO by WB8ZTL, Color Computer Morse Term 2 Program by Dynamic Specialties (W4GQC), COCOPACT - Packet Radio Software for the COCO by Monty Haley, National Weather Service RADAR Centers in the USA Listing, Software Systems Consulting WEFAX 4.0 Software (Global Photo on Citizen 120D Printer), Dallas Remote Image Group WEFAX Equipment and Source Supplier Directory, German Packet Radio Terminal Node Controller, Packet Racket Column (TCP-IP), Six Microsats Launched in Orbit, USATVS Questionnaire Offer, Classified Ads. Number of Industry Advertising Supporters: 31.

**MAY/JUNE 1990 - VOL. 20 NO.3:** (Red) 56 pages; Publishers Statement, From JAWS JAW (Editorial Comments), Independent Specialized Article Survey Results, FSTV Activity Reports, SKYBEACON Florida Balloon with ATV Plans, Latest News, Snowy Screen VK5ZEF and W4CVS deaths, Dayton Ramada Workshop Schedule, Time for Some New Wallpaper?, Q&A with WB0QCD, Building an ATV Repeater on a Beer Barrel Budget!, ATV Call Generator, Cheap Waveform Monitor, MATS System Diagram, 5 dbd Dual-Alford SLOT Antenna by W9DNT, 8-Channel deluxe DTMF Decoder Switcher Project, Upgrading the RT into an ATV/R System, KD0FW ATV Balloon Flight Exclusive!, New T.D. Systems Transceiver Rates P51-W9DNT/WB0QCD, Shack of the Month-W9DNT, 300 Ohm Slot Design by W8DMR (W9DNT), Que-Cards by K6GLG, Distributed Coaxial Dipole Improvement, 2 Meter J-Pole/Kenwood 731 Rig-KB0XL, Early TV & Radio Column with W1BHD, 24 CM. Interdigital Filter (BATC), On The Air Cartoon #16 by WA2OQJ, Low-Power TV Column with WB7PVO, Satellites, Facsimile and SSTV with W8ASF, Track Hurricanes with WA2OQJ Atlantic Oceanography Maps, COCORRTY 3 Program Update with KA0ZRO, N6LQV RTTY Program for the TRS80C Computer (actual program listed), Packet Racket with KA0JAW (Digi-Hopping & NETROMS), Developing a Battery Test System (and Computer program), Dayton Hamvention Videotape Offer, Classified Ads. Number of Industry Advertising Supporters: 34.

**JULY/AUGUST 1990 - VOL. 20 NO.4:** (Brown) 56 pages; Publishers Statement, From JAWS JAW (Editorial Comments), Latest News, "SYNC-BUZZ" ATV Column by WB0QCD, KD0FW Kansas City ATV Balloon Launch Update, Sorry, ATV & FM Signals Are Not Compatible-WB0CMC, Dayton Hamvention "Special Report!", New AEA Products, ICS, SSB Electronics new SP-70 Preamp, DRSI HF Modem, New Wyman TRIDON line FSTV Transceivers, E.A. World's Smallest Camera, New Mirage Amps and Preamps from Mirage, MFJ 1278 and 1292 Units, Elmer Schwittek K2LAF Retires, New R.F. Limited Audio Digitizer, Amateur TV in Australia, TV Q&A with NOIVN Column, Slow-Speed Control for Ham Rotors-WD5BJW, "ASK AEA" with Dr. Al Chandler K6RFK, August Fast Scan TV-DX Contest Rules and Logsheet, New Electronic Cottage Telephone Landline BBS!, Low-Power TV Column with WB7PVO, Satellites, Facsimile and SSTV with W8ASF, Satellite Keplerian Elements, Packet Racket with KA0JAW, Review of PRO-COMM Plus (Telephone Modem program) by WB0QCD, Classified Ads. Number of Industry Advertising Supporters: 25.

**SEPTEMBER/OCTOBER 1990 - VOL. 20 NO.5:** (Blue) 68 pages! NEW COLOR COVER & LASER PRINTING!; Publishers Statement, From JAWS JAW (Editorial Comments), Hot Off The Press - Latest News!, SYNC-BUZZ ATV Column with WB0QCD, New HAM-TV Handbook Announced, AEA FSTV-430a RIG Drawing/Contest, KD0FW Kansas City ATV Balloon Launch - The complete Story by WA0NKE, Results of 2nd Annual MATS ATV Receiver Contest, ...And In This Corner (Wyman WR-450 VS PCE TC-70 Rig) by WA0NKE, Fast Forward Video - TV Q&A with NOIVN, Accurate Bird Wattmeter Measurements for ATV, Picture Resolution, Sync-Buzz, Lines in KPAS transmitters, T.D. Systems Transceiver - Lab Test by NOIVN, Proposal for ATV Frequency Coordination Interference Standard, New C64 High-Resolution Video Generator EPROM Autoboot Cartridge from Engineering Consulting, Texas ATV/R at 1,425 feet!-W7KPW System, Ampire Model 440 Mast Mounted Preamplifier Review by WB0QCD, Six New Microwave Filter Company ATV Dplxers for Video TV Repeaters!, Micro-Mini CCD TV Camera by Mitchell Industries Review, Comparison with GBC CCD-100 Camera, Early TV & Radio Column with W1BHD (James Hawes KB9EPQ Letter), Vestigial Sideband Filtering - Its' time has come!, WB0QCD Response to W6HDO ATV/SSB QRM Letter (Opinion Poll), Micro-Computer Concepts RC-100 Repeater Controller Meets the new VS-100 Video Switcher! (Complete with schematics), Low-Power TV Column with WB7PVO, New Friendly Videos Videotapes, After Hours Software Review (IBM) by WB0QCD, Indiana TOP GUN ATV Contest Notice, Satellites, Facsimile and SSTV with W8ASF, PHONEVU 12/24 Second Cheap SSTV "kit" by PMC Electronics (diagrams and schematics), Multifax (A&A Engineering) AM/FM Demodulator & Power Supply "kit" Project, What is NASA SPACELINK BBS?, How to Use the New Electronic Cottage BBS! New AEA PK-232 Maildrop EPROM upgrade by WB0QCD, Classified Ads. Number of Industry Advertising Supporters: 41.

**NOVEMBER/DECEMBER 1990 - VOL. 20 NO.6:** (Blue) 68 pages!; Publishers Statement, From JAWS JAW (Editorial Comments), "Hot off the Press!" Latest News, SYNC-BUZZ ATV Column with WB0QCD, Clubs, Contests and Special Events! Column by WA0NKE, Fast-Forward Video - TV Q&A with NOIVN, The Great American Shootout! (WYMAN/AEA and PEC comparisons)-WV0J, 1990 N.A. FSTV-DX Contest Results!, Contest Logsheets, E.C. VIDG C64 TV Bulletin Board Cartridge by NOIVN, 12-page Build This TV Transmitter (project article) by Rudy Graf KA2CWX and William Sheets (Parts One and Two), Filters May Help? - SPECTRUM INTERNATIONAL reply to W6HDO ATV/SSB QRM Letter, Cable-TV Industry Employs Lots of Hams! by Steve Johnson N0AYE and Ron Hranac NOIVN, List of Cable-TV Hams, Early TV & Radio Column with W1BHD, From the Workbench Column by WBSKGL, 8-Bay H-Omni ZIGZAG Antenna Array Project!, Low-Power TV Column with WB7PVO, Slow-Scan TV and Facsimile with W8ASF, New RTTY AUTOSTART Column with WA2OQJ, The Multifax/Precision Team-KA0JAW, New SPACE TALK Column with KA7LDN, EC BBS, Statement of Ownership, Classified Ads. Number of Industry Advertising Supporters: 34.

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- **Operates on 13.8 VDC.** Perfect for mountain-top DXpeditions!
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- **Direct keyboard frequency entry.**
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- **Packet radio connector.**
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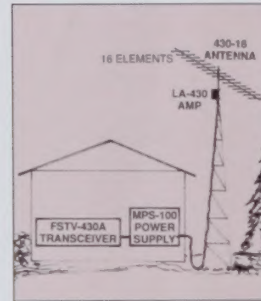
# INTRODUCING AEA's NEW ATV SYSTEM



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**The FSTV-430A Transceiver** features a low-noise UHF GaAsFET preamp with a typical noise figure of less than 1.5dB and a crystal-controlled or variable tuning down converter. Output is available on channel 3 or 4 for signal reception AND monitoring transmissions. Two frequencies can be selected from the front panel for transmission (one crystal is included). The AEA design is also optimized for superior video and audio quality without sync buzz even with weak signals. The FSTV-430A is the only transceiver you need to work ATV and it also allows you to use the same TV set to monitor your transmitted and received pictures.

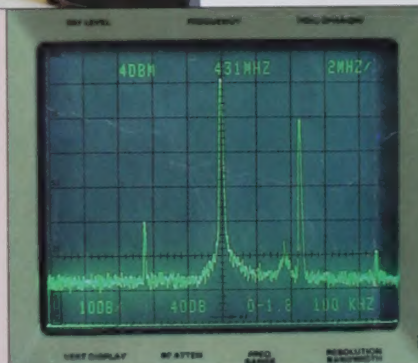
**The LA-430/50 Amplifier with Power Supply** gives a boost to your ATV signal. It includes a 50W P.E.P. mast-mounted Linear Amplifier (patent pending) covering 420 to 450 MHz and a GaAsFET preamp which utilize the antenna feedline for DC power. The mast-mount eliminates the line loss between the amplifier/preamplifier and the antenna to improve both transmission and reception, and is the equivalent of a 100W amplifier in the shack with a 3dB line loss. The amplifier is housed in a weather-resistant anodized aluminum case. The MPS-100 power supply also provides a 13.6 volt output for the FSTV-430A.

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## Advanced Electronic Applications, Inc.

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